TREATMENT

OF THE

DISEASES OF CHILDREN

BY

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TO

MY PRACTITIONER STUDENTS

PAST AND PRESENT

AT THE

NEW YORK POLYCLINIC MEDICAL SCHOOL AND HOSPITAL,

AT WHOSE SUGGESTION

THIS WORK HAS BEEN PREPARED

PREFACE TO THE SECOND EDITION

The reception of this work by the medical public and the reviewers has been most gratifying. In this second edition, an attempt to supply the practitioner a volume of increased utility has been the aim of the author.

I am indebted to Dr. Royal S. Haynes, Dr. Ward B. Hoag, and Dr. Hugh C. Thompson for their valuable assistance in the preparation of the work.

PREFACE

This work has been prepared for the general practitioner of medicine. It has not been written with a view to supplying the needs of either the specialist in children's diseases or the undergraduate student. The possibilities of therapeutic measures in the treatment of children have greatly increased during the past decade; and the author's effort in this volume has been to present to the physician in active general practice, modern methods of management in greater detail than has been attempted by the valuable books already on the market. The means and methods suggested herein are not drawn from the literature, but from experience based upon a somewhat extensive application of the principles evolved by the author in private and hospital practice. This book is offered, therefore, with the hope that it may be of service to other physicians in caring for an important group of their patients.

The author wishes to acknowledge his indebtedness to Dr. James F. McKernon for suggestions in the chapters on the diseases of the ear; to Dr. Thomas L. Bennett for suggestions in the chapter on Anesthetics; to Dr. N. Curtice Holt for the revision of the proof sheets, and to Dr. Royal Storrs Haynes for the arrangement of the index and his valuable assistance in the preparation of the chapter on Drugs and Drug Dosage.

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THE TREATMENT

OF THE

DISEASES OF CHILDREN

GENERAL CONSIDERATIONS

THERAPEUTICS IN CHILDREN

If I were asked what I considered the chief requisite for the successful practice of pediatrics I would answer: The education of the mother. It is impossible to do even fairly good work in diseases of children without proper home co-operation. A direction is never followed out as well as when the reason for it is understood.

Much of our beneficial results is due to the therapeutic influences of remedies outside of the realm of drugs. Thus, diet, fresh air, cold, heat, massage, electricity, climate—all are important therapeutic agents in the diseases of children. Successful therapy in children involves an understanding, a knowledge of detail, greater perhaps than in any other line of medical work. It not infrequently is an absence of such knowledge on the part of medical men which explains a great deal of the therapeutic doubt existing at the present time. Therapeutic nihilism, as far as pediatrics is concerned, means ignorance and incompetency. The time when the physician can make a diagnosis, and cease his interest in the treatment of the case is past. One of two things will happen in the absence of interest or ability on the part of the physician. The faith of humanity in curative agents is remarkable, and when the desired end is not reached by the first physician, some other physician is called; and when he fails, the next resort usually is the charlatan and the proprietary and patent medicines.

The prosperity of the irregular schools of various cults and "sciences" supposedly healing in character, and the consumption by the people of millions of dollars' worth of useless proprietary and patent drugs are to be attributed in a large degree to an indifferent application of therapeutic measures on the part of otherwise well qualified medical men. A few great teachers of medicine have

done an incalculable amount of harm by precept and example in their attitude toward therapeutics. Because they were or are unable successfully to treat disease they assume that it cannot be done. Thus therapeutic doubt, using the term therapeutics in the broad sense, has been in the past boasted of by men considered clever. Text-books on pediatrics are not without fault in encouraging careless practice, with necessarily an absence of favorable results, especially when they state that "treatment is along supportive lines." What constitutes "supportive lines" in a given case? How is the practitioner to know the author's mind? Or, again, perhaps it is stated that "free stimulation" is necessary. Stimulation how, when, why, and by what means is what must be known, in order to achieve satisfactory results. "Treatment according to the indications of the case" does not help a puzzled physician to any great extent. "Treatment along the same lines as in adults," adds no illumination when a desperately sick child is the patient, and moreover is faulty teaching, for the reason that the treatment in such instances should never be the same as in adults. An infant or young child can never be treated the same as an adult, either by drugs or other measures, unless we wish more thoroughly to convince ourselves of the uselessness of therapeutic measures. In order to practise therapeutics successfully in children the methods of the physician must be flexible and adaptable. Children vary greatly in their physical and mental equipment, much more than do adults. The practice of pediatrics is necessarily difficult, for every case has to be studied from its own standpoint. The physician who invariably treats all his cases alike will never do the highest class of work with children. The man, for example, who feeds all his difficult feeding cases after one rule or pattern will be sure to have some other practitioner get his failures, which will not be few. A source of disappointment to physicians, particularly in the treatment of young infants and children, is in the disorders of nutrition. A tremendous amount of patience is required in dealing with such cases, and the absence of prompt results is one of the difficult features he has to contend with in his relations with the family. There is, further, a distinction to be made as to what constitutes good results. If the infant develops into a strong child, we may chronicle our results as satisfactory even though a year was required before the condition of the patient was satisfactory. To cause a malnutrition baby weighing only eight pounds at six months, with marked milk incapacity, to show rapid growth by any method of artificial feeding is unusual, and our results are good if he gains but little during the first few weeks.

Chronic colitis, tardy malnutrition, or nephritis may require months and years for correcting and yet furnish satisfactory results. In therapeutics in infants and children, particularly as regards the

use of drugs, two points are to be kept in mind—the benefit hoped for and the possible harm that may result. A great deal of judgment must be used in the selection of remedies and the means of using them lest our best intentions result disadvantageously to the patient. Thus, in bronchitis and in bronchopneumonia the ammonium salts are often given in combination with heavy syrups such as tolu and wild cherry, both possessing little or no expectorant value, but they possess the property of interfering seriously with the patient's digestion. Doubtless alcohol used indiscriminately is, on the whole, productive of more harm than benefit, largely through disturbing the digestion. Digitalis, the salicylates, and the potassium and sodium salts are all to be used with judgment as to method and time of administration or they will do more harm than good. A point never to be lost sight of in the treatment of diseases of children is the desirability of keeping the gastro-enteric tract in the best possible condition. In children there are other factors also that bear upon the case that tend toward good or evil. The most careful diet and the best selected medication are of little value if the patient is overclad, kept in a superheated room with anxious, oftentimes nervously exhausted persons in constant attendance, with the disturbance to the patient which such attendance entails. However, it must be remembered that absence of proper detail and good judgment with resulting failures is no argument against the value of therapeutic measures, although it often furnishes the evidence upon which the argument is based. Much may be accomplished, by means of prophylaxis, in lowering the mortality in children under five years of age. In these the educated mother's aid is invaluable. She will lay aside prejudices and unfavorable family influences when a physician's direction appeals to her reason. Marasmus, malnutrition, and the intestinal diseases of summer, which directly or indirectly are the cause of thousands of deaths yearly, are to a large degree preventable if the right step is taken at the right time, through the early appreciation of danger-signals on the part of both the physician and the mother.

CLOTHING AND ADDITIONAL REQUIREMENTS FOR THE EXPECTED BABY

The physician should instruct the young woman who for the first time expects to become a mother as to the necessary clothing and toilet articles which she will need for her convenience in the care of the child. A basket in which all the toilet necessities for the baby may be kept together will be found a great convenience when the time for their use arrives.

The basket should be provided with a good-sized pin-cushion and pins;

Puff-box and puff;
Soap-box, containing castile soap;
Infant's hair-brush and fine comb;
Eight ounces of a saturated solution of boric acid for mouth and eyes;
One-half pound of absorbent cotton;
A package of wooden toothpicks;
A flexible tube of white vaselin;
A bath thermometer;
One yard of plain sterile gauze;
Plenty of soft old linen;
Six of the best baby towels;
A white eiderdown blanket one and one-half yards long;
One pair of small scissors;
A package of nickel-plated safety-pins (three sizes);

Clothing to be provided:

Forty-eight cotton diapers, made from birdseye cotton diaper; two sizes are necessary:

(*a*) Three pieces 20 inches wide.
(*b*) Three pieces 22 inches wide.

One yard of white flannel for belly-bands. Leave the piece as it is, to be used by the nurse as required. After the sixth week, knitted bands with shoulder-straps are preferable.

Four second-size silk-and-wool shirts;
Six pinning blankets made of white flannel with cotton bands;
Three flannel shirts;
Three eiderdown wrappers;
Three Cashmere sacques;
Three bath aprons of shaker flannel for the mother or nurse, to be used to cover the baby after he is taken from the bath;
Three pads, each one yard square, and three each one-half yard square. These are necessary for the crib and lap.

Diapers.—Diapers are best made from soft light-weight goods which absorb readily. Birdseye cotton diapers are satisfactory. The diaper should be removed when soiled and placed in a covered pail containing a carbonate of sodium solution, one ounce to two gallons of water, or in carbolic acid solution 1 : 100. Before using, whether soiled with urine or feces, they should be boiled and washed with plain Castile soap. Several rinsings will be required before the napkins are dried, so as to remove the soda and soap. They should not be dried in the nursery. The rubber protector used as a cover for the napkin should be used only during cold weather and when the child is out of doors. After changing the diaper the mother or nurse must immediately scrub her hands and nails thoroughly with hot water, soap, and brush. A diaper washer unique in design and satisfactory in its work is the washer known in the market as Cunnee's

sanitary napkin washer.[1] This is so constructed that it may be attached to the hot-water pipe of any bath-room. It does away with the disagreeable features of diaper washing by hand and lessens the dangers of contamination of food apparatus and food at the hands of the nurse.

THE YOUNG MOTHER

In order to achieve success in pediatrics, the physician requires the active coöperation of trained helpers. The more capable the mother and nurse, the greater the success that will crown his labors when children are his patients. The physician, therefore, should undertake the instruction of the young mother in the rudiments of the child's care. In my own experience, the intelligent mother, regardless of her station of life, has proved a most satisfactory pupil. Endowed with good common sense, with her powers for reasoning well developed, and possessing an ability to appreciate scientific principles, her usefulness as a mother is thus increased tenfold.

In order to secure her full coöperation and confidence she must be told not only what to do, but how and why it should be done. In the matter of infant-feeding, for example, if it is explained to a mother of fair intelligence that condensed milk and the proprietary foods, when prepared for use, are weak in fat, weak in proteid, and contain much less of these nutritive elements than does mother's milk—the food which the child has a right to demand—she will at once be convinced that such food is not suitable for her baby. It will then be comparatively easy to convince her that cow's milk for the great majority of infants is the only suitable substitute for mother's milk.

It is my object to have the mother know as much of child life as she is capable of understanding. She is encouraged to attend lectures to mothers and mothers' meetings. She is advised to subscribe for mothers' journals and to buy books and reading-matter for mothers, for the reason, which is perhaps not entirely unselfish, that I have had signal success with the infants of well-informed mothers. The children of such mothers, as the result of a properly regulated life, have better appetites and less illness; they are stronger and more vigorous than those indifferently cared for. If disease attacks them, they make more prompt and satisfactory recoveries; if an operation is required, intelligent mothers appreciate its necessity. As children, their offspring are better specimens of the race, and as adults, they will always have reason to be thankful that their mothers were educated and efficient in child management.

A mother should know what to do in case of sudden illness and she should know when to send for the doctor. I teach the mothers

[1] Manufactured by The International Sanitary Manufacturing Co., Portchester, New York.

of my patients never to look lightly upon a sore throat or trust to their own judgment in dealing with it, but promptly to seek medical advice, with the result that repeatedly cases of diphtheria have been on the way to recovery when an ignorant or careless mother would be treating them by home methods with the children growing rapidly worse. By the ignorant, I do not necessarily mean the poor. Many of my dispensary mothers show surprising intelligence and good judgment when they are most needed.

A mother should be taught never to rely upon her own judgment if a child complains of persistent pain in the stomach. She is told that it oftentimes means a great deal more than simple colic. I have known precious lives to be lost because the mother made a diagnosis of colic and treated the child for such a condition, when it had appendicitis. A mother should be instructed to stop milk, to give a dose of castor oil and a carbohydrate diet with the first indication of summer diarrhea, and then to send for the physician, no matter how trivial the indisposition. She is told that, in the intestinal diseases of summer, the child is poisoned by a process of bacterial infection in the intestinal contents and that milk furnishes the best food for the bacteria that cause the trouble. She is told that the child who is badly fed and who has repeated attacks of indigestion and diarrhea during the winter and spring will be much more susceptible during the summer to serious intestinal involvement; and that proper feeding and the immediate correction of digestive errors are of paramount importance at all seasons of the year. She is told how to dress her child in summer. She is taught the necessity of fresh air at night and the value of outdoor life at all seasons of the year; that a so-called "cold" is usually an infection of the respiratory mucous membrane due to dusty ill-ventilated rooms or dusty streets and not to the fact that a window was left open for a few moments; that a child cries from other causes than hunger; that fever, whatever its cause, requires that the child's food be weakened at least one-half in the bottle-fed, and that an ounce or two of water be given before nursing in the breast-fed; that drug-giving to children is a habit which is to be condemned, the child in health requiring little or nothing in that line.

With an educated mother not only are our results much more satisfactory, but the annoying outside influence of officious relatives and neighbors is thus effectually neutralized.

THE NURSERY MAID

In certain stations and conditions of society, the young child is cared for by its mother with the assistance of the immediate members of the family. In thousands of homes, however, a helper is employed to take charge of the child or assist in its care. The selection of a nursery maid is a matter of much importance. Schools for training

nursery maids exist in New York city, Boston, Albany, Newark (New Jersey), and doubtless in some other cities; but, although such trained help is greatly to be desired, the supply is very limited. Some of my best children's attendants have been women who, although they have not passed the meridian of life, still have reached the seasoned age when the attractive qualities of policemen and grocery boys have faded into a dim recollection! Any industrious, sensible young woman of quiet tastes who is fond of children, can be trained in a few weeks into a most useful helper. The association of the nursery maid and child is a close one, and it is the physician's duty to know that the applicant is physically fit for the position.

During the past year the writer has known of three nursery maids who developed pulmonary tuberculosis while in service. Not only should the applicant's lungs be examined, but also the mouth, nose, and throat. Carious teeth, and diseased conditions of the throat and nose, should receive careful attention before the maid is allowed to assume the position. It is also important that something of the applicant's previous life should be known.

One of the most important things to know about an applicant in a large city, and one most difficult for the physician to discover, is the matter of leukorrhea or vaginal discharge.[1] This, however, can usually be discovered by the tactful young mother. Not only should the ideal nursery maid be physically fit, she must be mentally fit as well. For proper mental and physical development, children must be entertained and pleasantly employed. An ill-natured, impatient nurse should be forced to seek other employment. It should not be a task for a child's attendant to play with him. A woman should not be condemned, however, because she fails with any given child. With a child differently situated, with a different temperament, the results may be perfectly satisfactory. I have known not a few such instances.

THE NURSING-BOTTLE AND NIPPLE

There are two requirements that a nursing-bottle must fulfil: It must have a capacity sufficient for one full feeding and it must be so constructed as to be readily cleansed. The oval bottle (Fig. 1) with rounded edges answers best. These may be obtained in sizes of from three to nine ounces. As many bottles are needed as there are feedings in twenty-four hours. The bottle should be boiled once a day, scrubbed with a stiff brush with hot borax water, and remain in the borax water until needed. Two teaspoonfuls of borax to a pint of water is the strength usually used. Before using, bottles should be rinsed in plain boiled water. The straight, black nipple

[1] A very severe gonorrhea was recently contracted by one of my patients from a nursery maid.

(Fig. 1) is also preferred, for the reason that it can be turned inside out and easily cleansed. A nipple which cannot be turned should never be used. After using, a nipple should be turned and scrubbed with a stiff brush and borax water—a tablespoonful of borax to a pint of water. When not in use, the nipple should be kept in borax water. Before placing it on the bottle, it should be rinsed in boiled water. The nipple should be boiled once a day. The blind nipples—those without holes—are the best. Holes of the required size may be made with a red-hot cambric needle.

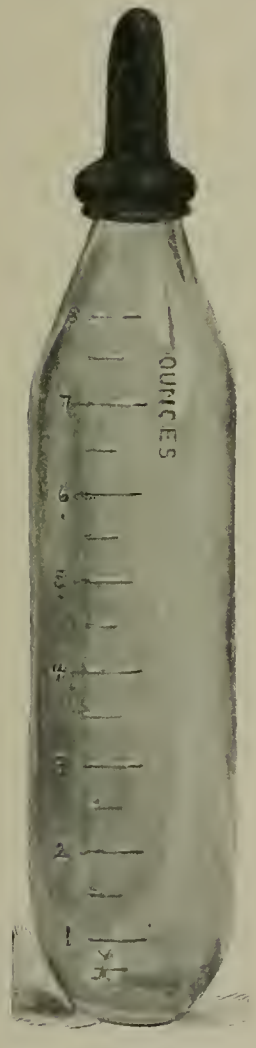


FIG. 1.—NURSING-BOTTLE AND NIPPLE.

THE NURSERY

The nursery should be the largest and best ventilated room in the house. In a city home it is well to have it on the third or fourth floor with a southern exposure. In apartments, quiet and the possibility of free ventilation and sunlight must be considered in selecting the room. For the sake of quiet, the nursery should not communicate with the sleeping-rooms of older children.

In placing children in sleeping-rooms or in a nursery or in estimating the capacity of hospital wards for children, it is to be remembered that at least one thousand cubic feet of air-space should be allowed to each child.

The floor of the nursery should not be carpeted. A hard-wood floor is best. If this is not possible, covering the floor with oil-cloth or linoleum is always possible. This can be cleaned with a damp cloth every day. A broom should never be used in a nursery. Paint or hard finish on the walls is preferable to paper. There should be at least two windows and an open fireplace. If possible, the bath-room should be connected with the nursery, to be used not only for bathing the child but as a "changing room." The child's napkins should not be changed in its living-room if it can be avoided. It is needless to say that napkins should never be dried in the nursery.

Steam heat as ordinarily used today is the least desirable means of heating, on account of its uncertainty. In many New York apartments of the better class, the fires are banked at 10 P. M.; the temperature when the child retires is from 70° to 80° F. or more; by five or six o'clock in the morning a fall to from 50° to 60° F. has taken place. Such a change in the temperature, with the tendency of children to kick off the bed-clothes, explains many cases of ton-

sillitis and bronchitis. The temperature of the nursery should be kept as even as possible. When for any reason this cannot be controlled, it is best to have two means of heating, so that when one fails the other may be used. The open-grate fire or a small wood-stove is best. Gas ought never to be employed as a means of heating a child's sleeping-room, on account of the rapid exhaustion of the oxygen which results from its use.

The furniture of the nursery should be of the plainest. Hardwood chairs and tables with enamel or brass cribs or bedsteads should be used. There should be no article of furniture or furnishings in a nursery, that cannot be washed. There should be in the bath-room or in some room adjoining, a pail containing some disinfectant solution, such as carbolic acid, 1 : 100, or carbonate of soda solution, 1 ounce to 2 gallons of water, in which the napkins are placed as soon as soiled.

There should be two shades at each window, a light and a dark shade, so that it will be possible to darken the room during the sleeping time, as well as to exclude the early morning light, which is the usual cause of too early waking. Babies should be taught to sleep until at least six o'clock in the morning. This is far better for the child and also for the mother if she occupies the same room. The unnecessary habit of an early waking at four or five o'clock will in most instances readily be broken by keeping the room dark.

The nursery should have suitable means for ventilation. For this purpose, aside from the fire-place, I have found the window-board (page 44) of no little service. It can be made of any width. Ordinarily, I have it made about four inches wide. It is sawed so as to fit tightly under the lower sash. This leaves an open space corresponding to the width of the board between the upper and lower sash, and allows the entrance of a current of air which is directed upward. There should be a thermometer in every child's living-room or nursery. It should register from 70° to 72° F. by day and from 65° to 68° F. by night. The nursery should be given an hour's airing twice a day. The child should sleep alone in its crib. It should not sleep with an adult or an older child. The old-fashioned cradle in which generations have been rocked may be an interesting heirloom, but under no circumstances should it be removed from its place in the garret. It is realized that the above suggestions are not applicable in many homes. Nevertheless, if we aim at the ideal, existing conditions, no matter how unpromising, will invariably be made better.

BASKETS FOR EARLY EXERCISES

It is a mistake made in many families to have the baby in the arms a greater part of his waking hours. This practice should be discouraged by physicians, for when the child is held, there is always a tendency to make him sit upright on the arms or knee without

proper support. During the early months of life the vertebræ and vertebral ligaments are not sufficiently developed to support the heavy head and trunk. If this thoughtlessness on the part of parents with its attendant dangers were explained, there would be fewer cases of displaced scapulæ and spinal curvature to be treated later on. Many of the cases of spinal curvature which we see are the direct outcome of such early abuse of the spinal column. Still, it is not desirable that the child should constantly occupy its crib. A large clothes-basket in which a thick blanket and pillow have been placed furnishes a safe playground for a small baby. For the first few months he will lie on his back and amuse himself in his own peculiar way. After the sixth month, when he may be allowed to sit up for a short time each day, a pillow should be placed behind his back for support. The basket furnishes plenty of room for toys and other means of entertainment. When the child begins to stand and attempts to walk, the basket period is at an end and the exercise pen (page 37) should be brought into use.

THE CARE OF THE STUMP OF THE UMBILICAL CORD

The space devoted to the care of the umbilical cord might seem out of place in a work of this nature. The excuse for it is the frequent appearance in private practice and in out-patient clinics of infants with umbilical polypi, granulomata, suppurating umbilical stumps, or an eczema involving a considerable area about a moist, actively secreting umbilicus. The management of granuloma, polyp, and localized eczema about the umbilicus has been referred to elsewhere. In order to secure a rapid and complete cicatrization after the cord falls, it is always desirable to keep the parts dry. I have used with gratifying success a powder composed as follows:

℞. Pulveris acidi salicylic.....grs. x
Pulveris acidi borici.....grs. xxv
Pulveris amyli
Pulveris zinci oxidi.....āā ℥ss

Over this powder, which is used freely in the open wound, is placed a pad of gauze to hold it in position. The dressing should be changed and fresh powder applied every time the child is fed. For the small unhealthy granulations which will often be present, cauterizing with a 50 percent nitrate of silver solution may be necessary once or twice, after which the powder is used until the secretion has entirely ceased and cicatrization is complete.

CRYING

It is well for the young infant to cry a little every day. Muscular movements involving a greater part of the body accompany the act of crying and furnish exercise. Peristalsis is increased, as is often evidenced by a movement of the bowels occurring at the time, particularly when there is diarrhea. In crying, deep breathing is necessary, the lungs are expanded, and the blood oxygenated. The

well baby cries when frightened, or uncomfortable from hunger, soiled napkins, or inflamed buttocks. He cries from pain, from heat, from cold, from unsuitable clothing, and during difficult evacuation of the bowels. He also cries when displeased or angry. Authors are prone to refer to the diagnostic value of an infant's cry. It is my belief that characteristic cries are not to be depended upon sufficiently to give them a differential diagnostic dignity. Children slightly but painfully ill may cry incessantly for an hour or two. Thus, with intestinal colic, where the cry is loud and continuous until the child is relieved or until he falls asleep from exhaustion. Earache is not an infrequent cause. The habitual criers, the restless and vigorous, crying, whining infants, are uncomfortable. With very few exceptions the trouble will be found in the intestinal tract. The well-trained, normal child, whose nourishment is suitable, is seldom troublesome. When well, all babies are naturally good-natured and happy in their own way. Badly managed, spoiled infants often cry vigorously when left alone. When attention is given them, when they are taken up and talked to, the crying ceases. This readily tells us that pain or discomfort was not an element in causing the cry. In these infants, discipline, not medication, is needed. The management of the habitual crier involves the relief of the condition which causes the discomfort, or the most rigid discipine, when it is demonstrated that we are dealing wth a "spoiled infant."

SLEEP

The infant that sleeps well is almost always a normal, well-fed baby. Irritability and sleeplessness are associated with indigestion more frequently than with any other disorder. During the first few days of life, the sleep, in normal conditions, is almost unbroken, except when the infant is fed. During the first month the infant sleeps about twenty-two hours out of every twenty-four. During the second and third months, from twenty to twenty-two hours. At the sixth month the child should sleep from 6 P. M. to 6 A. M. without interruption other than for feeding or nursing, which need cause very little disturbance. At this age there should be a two-hour nap during the morning and a two-hour nap in the afternoon, although it is not well to have the baby sleep after three o'clock in the afternoon. The twelve-hour night rest should be continued until the child is six years of age. The day naps will gradually be shortened by the child. At one year of age, one hour in the morning and two hours in the afternoon suffice. From the eighteenth month to the second year, the morning nap is given up. Afternoon rest for at least one and one-half hours should be continued until the child is six years of age, and longer if he is inclined to be delicate. Regular sleep is largely a matter of habit, and if the infant is started right with suitable feedings given at definite times, followed by the proper period of sleep, but little trouble will be experienced with sleepless-

ness. When sleep is disturbed and broken, it means bad habits, unsuitable food, minor forms of indigestion, or positive illness of some kind. Sleep is important for purposes of growth, not only in early infancy but throughout childhood. Not a few infants form habits of sleeping in the daytime and being wakeful at night. This is best remedied by keeping the baby awake, when he should be, during the day, by entertainment and by keeping him in a well-lighted room. I am sure that the satisfactory results which I have had the good fortune to achieve in the treatment of secondary malnutrition and anemia have been due in part to my insistence that the child sleep in a quiet, darkened room for two hours after the noonday meal. The energy expended in twelve hours by an active child is incalculable, and when a portion of this energy is reserved and the body fortified by rest and sleep during the middle of the day, it means a greatly diminished daily expenditure of strength units.

KISSING

Such a topic may be considered out of place in a work of this nature, but in taking up the child's management in all its details, it is my belief that a few remarks on this subject are perfectly in order. Every detail of the child's daily life should be under the oversight of the physician, and if he is to do his full duty, he must give a certain amount of voluntary, unsought advice. A custom concerning which he will not be consulted is the matter of that most unhygienic practice of kissing.

A child should never be kissed on the mouth, and this is a standing order with all my patients. I have known, in my own private practice, of instances where tuberculosis, diphtheria, and syphilis have been communicated from the diseased adult to the innocent child by this disgusting practice. Neither should the child's hands or fingers be kissed, as the hand or fingers of the majority of babies is in their mouth many times an hour. If the baby is the first one that has graced the household, and *must* be kissed, this can be accomplished with the least damage, if the kiss is implanted on the head or forehead. The parents must make the rule, and they must set the example by adhering to it themselves. Among my patients, a nurse who is known to have kissed the child is punished by dismissal. Because an adult is apparently well, is no excuse for this indulgence. Healthy adults frequently have in their mouths the germs of tuberculosis, of diphtheria, and of other diseases, and never suffer from their presence because they are strong adults with vigorous mucous membranes which do not furnish as favorable a soil for the growth and development of pathogenic bacteria as do the more delicate mucous membranes of the young. It is criminal, therefore, to subject the child to such dangers. Scarlet fever, measles, and whooping-cough are all most readily transmitted at

the beginning of an attack through the close contact required by a kiss.

Kissing should not be allowed among children. Little girls are very prone to follow the customs of their mothers, whether good or bad; hence, the necessity of advice in this direction which will be particularly impressed upon the physician if he will observe the interchange of bacteria which takes place on the sailing or arrival of any of our large ocean steamers!

BATHS

The newly born child should be given daily a basin-bath with lukewarm, boiled water and castile soap until the cord falls and the navel heals. When this has taken place the tub-bath may be given. The temperature of the bath for the very young infant should not be below 95° F., nor above 100° F. Very young children should not be kept in the water more than three minutes. After the third or fourth month a temperature of 90° or 95° F. is best, the child being kept in the water about five minutes. At this age I prefer to have the tub-bath given at night, just before the child is put to bed. A basin-bath may be given in the morning. When the child is a year old and fairly vigorous, the temperature of the water at the beginning of the bath should be 90° F. This should gradually be reduced to 80° F. by the addition of cold water, the child being vigorously rubbed with the hand while in the water. The temperature of the room should be from 76° F. to 80° F. during the bath, and windows and doors should be closed. When removed from the tub the baby should be dried quickly and thoroughly, and the folds of the skin should be well powdered. A sponge should never be used in any portion of the bathing process. It should never be included in the nursery outfit. It is never clean after it has once been used. Some children have a dread of the bath, and cry frantically when placed in the water. This is due to fear, and may usually be overcome by placing a sheet over the tub and lowering the child on it into the water.

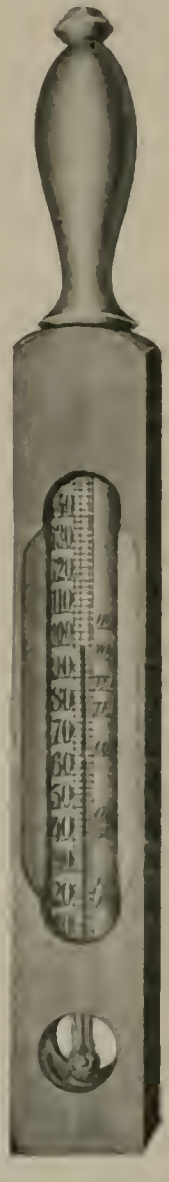


Fig. 2.—Bath Thermometer.

The Cold Douche.—For "runabouts" from two to three years old it may not be wise to use water below 70° F., but many patients over three years have the water applied in the form of a cold douche after the cleansing bath, during the entire twelve months at the

temperature at which it runs from the faucet. In winter, in New York houses, this ranges from 50° to 60° F.

In giving the cool douche the child should stand in warm water covering the ankles. The douche may be used in the form of a spray or shower or the water may be applied by means of a sponge moistened with it at the desired temperature. The head, if the shower or spray is used, should be suitably protected by an oil-skin or rubber bathing cap.

After the cold douche there should be a vigorous friction of the skin with a rough towel. If there is not a quick reaction, if the skin does not become warm and glowing, warmer water should be used. So also with blueness of the extremities and "goose flesh," use water less cold, but do not discontinue the douche.

In the great majority of homes the bathing of the children can be carried on with greater convenience immediately before their bedtime. The child should receive the warm bath and the cool douche, and then, in night-clothes, a warm wrapper, and suitable foot covering, he should eat his supper. However, if this time is not convenient, he may be given the evening meal at 5.30 or 6.30, followed in one hour by the bath and bed.

Tub-baths for Fever.—Place the child in water at a temperature of 95° F. and reduce to 75° F. or 80° F. by the addition of ice or cold water. The duration of the bath should not be more than ten minutes, constant friction being maintained during the entire process.

Basin Bathing for Fever.—Add eight ounces of alcohol to a quart of water at a temperature of 70° F. The child is stripped and covered with a flannel blanket, and the entire body sponged with this solution for ten or fifteen minutes. Drying the skin should not be practiced. Allow the alcohol and water to evaporate from the body surface, as by this means a greater reduction in the temperature will be effected.

Either the tub-bath or the basin-bath may be used by the mother in case of sudden high fever—104° to 105° F.—before the physician arrives. She should be so instructed.

Bathing for Comfort in Hot Weather.—The basin-bath and tub-bath may also be used as a means of relief during very hot weather. One or two basin-baths a day, with a tub-bath at bedtime during this trying season, will give the child much relief, and help him to pass safely through it. The very young feel the extreme heat most acutely, and endure it with difficulty. I know of nothing else that will give a restless, uncomfortable, heat-tormented child such a refreshing sleep as will a cool tub- or basin-bath.

Mustard Bath.—A mustard bath is prepared by adding a heaping tablespoonful of mustard to 6 gallons of warm water. From five to ten minutes in the bath is all that is advisable to allow. The special use of the mustard bath is in the treatment of convulsions; it will be found useful also for nervous children who sleep badly.

Two or three minutes in the mustard water, followed by a quick rubbing immediately before going to bed, are oftentimes all that will be required to induce refreshing sleep.

Brine Bath.—A brine bath—an even tablespoonful of salt to each gallon of water at a temperature of 95° F.—is of great service with very delicate, poorly nourished children. Its action is that of a tonic. If the child is thoroughly soaped and washed with plain water, and then immersed in the brine bath, no further tubbing is necessary. The child should be kept in the bath for five or ten minutes, constant friction being continued during the entire time. The brine bath is not applicable to children with intertrigo or eczema, or any condition in which there is an inflammation of the skin.

Soda Bath.—The soda bath is of some service in cases of prickly heat from which many children suffer during the summer. A tablespoonful of bicarbonate of soda should be added to each half gallon of water used. The temperature of the water should be that to which the child is accustomed. From two to four minutes in the water suffices. There should be little or no friction of the skin. The child should be dried with soft towels.

Bran Bath.—The bran bath also is of service in prickly heat. One cup of bran is mixed with the water in the bath-tub and the same method employed as for the soda bath.

Starch Bath.—The starch bath also is useful in prickly heat. One-half cupful of powdered laundry starch is mixed with the water in the bath-tub, and the same method employed as for the soda bath.

Hot Bath.—Place the child for from three to five minutes in water which has been raised to a temperature of 105° or 110° F. Constant friction of the extremities is maintained while in the water.

WEIGHT

The average weight of the full-term newly born infant varies from six to nine pounds. Some are born at term weighing less than six pounds and a few weighing over nine pounds, but in the great majority the birth-weight will be found between these figures. Holt found from a study of the records of three large maternity institutions in New York city as follows:

The average weight of 568 females was 7.16 pounds.

The average weight of 590 males was 7.55 pounds.

Every family which can afford it should have a scale (page 33) for weighing the baby, for only by regular weighing during infancy and childhood can we gain an accurate knowledge of the growth of the child. During the first five days of life there is usually a loss in weight of from four to six ounces. After this initial loss, which may be expected but which does not always occur, a weekly gain in weight is to be looked for, the child regaining the birth-weight on the eighth or tenth day. At first it is advisable to weigh twice a week, or even daily, if the child is not progressing satisfactorily. After the

second month, when he is making satisfactory progress, a weekly weighing will answer, and this should be continued until the child is one year of age. During the second year, bi-monthly weighings are sufficient. Girls of the same age, after the first year, will average from one-half to one pound lighter than boys. During the third year, monthly weighings will be sufficient to enable one to keep in touch with the child's condition. During the first six months of life a weekly gain of from four to eight ounces has been made by the well children under my care. When a child does not make at least an average gain of four ounces weekly, I do not put him in the "doing well" class, but look into his care and nutrition to learn what is wrong. Children vary in their growing capacity. Some will increase in weight rapidly, gaining three ounces a day, which I have seen in some cases, while others will make a slower gain and yet be perfectly well. Through the care of many children, I have come to regard four ounces as the minimum weekly gain for a well child. In a well infant the birth-weight should be doubled by the fifth or the sixth month, and in one year his weight should be a little over two and one-half times that at birth. During the second year a gain of from five and one-half to seven pounds will usually result under proper conditions. During the third year from five to six pounds will be added. At the fifth year the weight should be in the neighborhood of forty-one pounds. It is not to be inferred that these are arbitrary figures or that perfectly well children may not be under or above the figures given at the ages mentioned. They are, however, to be regarded as the averages for the different ages.

A weight chart with its colored "normal" line will not be found in this book and physicians are advised against its use. Time and again I have seen well infants, though slow in growth, made ill by overfeeding, in the vain attempts of an ambitious mother or nurse to keep her infant up to the "normal" line. It may be said that the weekly weighing might have similar effect; not so. Here there is nothing for comparison—no normal red line staring the mother in the face.

The weighing alone is not sufficient to tell us absolutely as to the development of children. I have seen condensed-milk babies who showed a most satisfactory weight curve, yet who, on examination, were by no means up to the requirements for their age as regards their bone and muscle development. A nursing or bottle baby should be examined once a month in order to determine if the progress is along the desired lines as shown by the condition of the teeth, the fontanel, the long bones, and the muscles.

The following table from Holt's "Diseases of Infancy and Childhood" gives the weight and height of children from birth to the sixteenth year. The weights under five years are in children without clothing. After the fifth year the weight of the clothing is to be deducted. The average weight of house-clothing, according to

Holt, who quotes Bowditch, is at the fifth year 2.8 pounds for both sexes; at the seventh year, 3.5 pounds for both sexes; at the tenth year, 5.7 pounds for boys and 4.5 pounds for girls; at the thirteenth year, 7.4 pounds for boys and 5.6 pounds for girls; at the sixteenth year, 9.7 pounds for boys and 8.1 for girls. These weights must be deducted from the gross weights in order to obtain the net weights of the children. The season of the year, of course, would make some difference as to the weight of the clothing, although this point is not mentioned by the observers.

Age.	Sex.	Weight. Pounds.	Height. Inches.
Birth	Boys	7.55	20.6
	Girls	7.16	20.5
6 months	Boys	16.0	25.4
	Girls	15.5	25.0
12 months	Boys	20.5	29.0
	Girls	19.8	28.7
18 months	Boys	22.8	30.0
	Girls	22.0	29.7
2 years	Boys	26.5	32.5
	Girls	25.5	32.5
3 years	Boys	31.2	35.0
	Girls	30.0	35.0
4 years	Boys	35.0	38.0
	Girls	34.0	38.0
5 years	Boys	41.2	41.7
	Girls	39.8	41.4
6 years	Boys	45.1	44.1
	Girls	43.8	43.6
7 years	Boys	49.5	46.2
	Girls	48.0	45.9
8 years	Boys	54.5	48.2
	Girls	52.9	48.0
9 years	Boys	60.0	50.1
	Girls	57.5	49.6
10 years	Boys	66.6	52.2
	Girls	64.1	51.8
11 years	Boys	72.4	54.0
	Girls	70.3	53.8
12 years	Boys	79.8	55.8
	Girls	81.4	57.1
13 years	Boys	88.3	58.2
	Girls	91.2	58.7
14 years	Boys	99.3	61.0
	Girls	100.3	60.3
15 years	Boys	110.8	63.0
	Girls	108.4	61.4
16 years	Boys	123.7	65.6
	Girls	113.0	61.7

Scales.—A scale for weighing the baby is a very necessary adjunct to the nursery furnishings. There are several varieties of scales on the market known as "baby scales." Their usual construction is that of a basket for holding the baby, the basket being supported by a steel rod which rests upon a spring. A needle indicates on a dial the weight of the child. This variety of scale is very unsatisfactory: it gets out of order easily, it is expensive, and with a vigorous,

kicking child, the rapid oscillation of the needle makes an accurate reading of the weight a difficult if not an impossible matter. Further, the weight capacity of these scales is but twenty pounds. When the child's weight reaches this figure, it necessitates the purchase of another scale. The scoop and platform scale used by grocers (Fig. 3) answer the purpose far better than any other. They do not easily get out of order, they weigh correctly from one-half ounce to two hundred and eighty pounds, and being very simple in construction they can readily be understood. The infant rests on his back in the

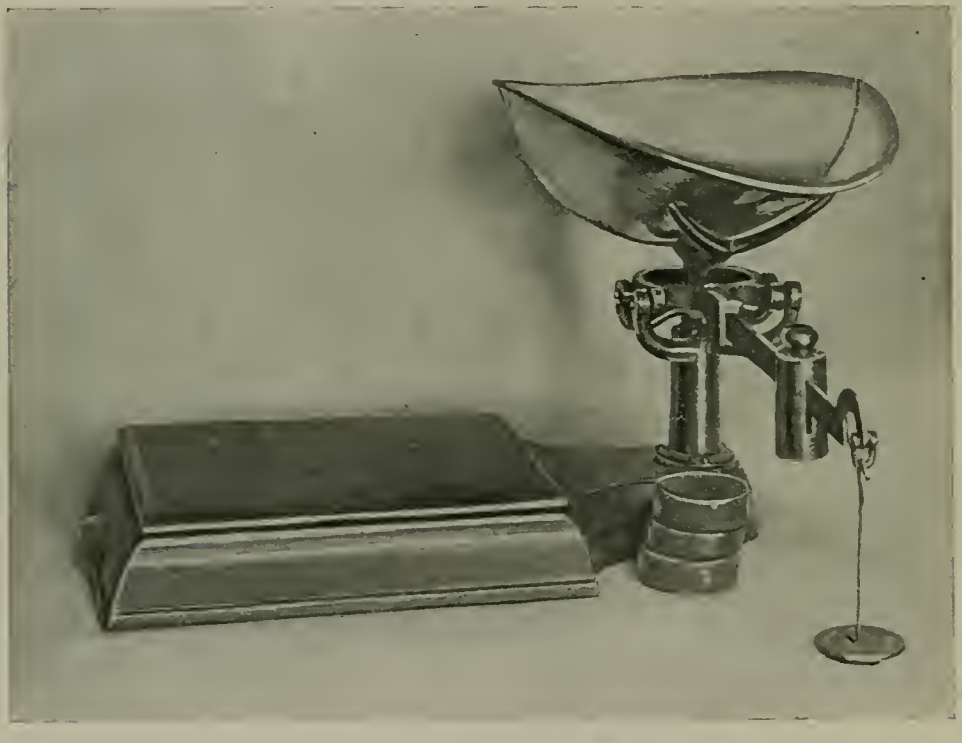


FIG. 3.—SCOOP AND PLATFORM SCALE.

scoop during the weighing process; older children stand on the platform. These scales are inexpensive, costing but $3.75.[1]

HEIGHT

The length or height of children at the various ages is for convenience included in the above table. From the standpoint of health or development, this is of no great significance. The length at birth usually varies from 19½ to 21 inches. Children suffering from tardy malnutrition, particularly if syphilitic, may be undersized. Not a few of the non-specific malnutrition and anemic children are tall and thin. It is often a matter of no little distress to parents, that their children are undersized. Short mothers and fathers cannot expect very tall children. They will probably be larger than the parents if they get the right care, but they cannot be expected

[1] The scoop and platform scale may be obtained at the Metropolitan Hardware Co.'s, Church and Vesey Streets, New York.

to grow as much as some of their playmates, whose fathers and mothers are tall. The height bears much less relation to the condition of the child than does the weight.

THE TEETH

Twenty teeth comprise the first set. In the well child the first tooth usually appears between the sixth and the eighth months; the first teeth may, however, in perfectly normal cases, come earlier or much later. I have known well, vigorous children who did not get a tooth until the thirteenth month. The first teeth are usually the two lower central incisors. The four upper incisors and the two lower lateral incisors appear normally between the eighth and the tenth months. The first four molars appear between the twelfth and the fifteenth months. The four canines between the eighteenth and the twenty-fourth months, the four posterior molars, which complete the first set, between the twenty-fourth and the thirtieth months. This regularity in the appearance of the teeth is by no means constant, even in well children. I have repeatedly seen the upper central incisors cut first and in several instances the upper lateral incisors have appeared first. In delayed dentition in rachitis and other forms of malnutrition, the teeth are very apt to appear irregularly. In a markedly rachitic dispensary patient the bicuspids were the first teeth cut.

Care of the Teeth.—As soon as the teeth appear they require attention. Until the second year is reached the mouth should be washed out at least twice a day with a solution of boric acid—one ounce to a pint of water. This can best be done by means of absorbent cotton wound around the tip of a clean index-finger and afterward dipped into the solution, when it should be applied with gentle friction to the gums and teeth. When a child is two years old, it is well to begin the use of a soft tooth-brush and a simple tooth-powder composed of the following ingredients:

℞. Precipitated chalk.....℥j
Bicarbonate of soda.....℥j
Oil of wintergreen.....q. s.

The child should also be instructed as to the proper use of a quill toothpick. The teeth of every child over two years of age should be examined by a dentist every six months. If cavities are discovered in the first teeth they should be filled with a soft filling.

The milk teeth are lost between the sixth and the eighth years. They should not decay, but fall out or be forced out by the second set.

The Permanent Teeth.—The permanent set comprises thirty-two teeth. The second dentition begins about the sixth year, and is usually completed about the twentieth year, although it may be delayed several years. The permanent teeth appear in somewhat the following order:

First molars.....sixth year.
Central incisors.....sixth to seventh year.
Lateral incisors.....seventh to eighth year.
First bicuspids.....ninth to tenth year.
Second bicuspids.....ninth to tenth year.
Canines.....eleventh to twelfth year.
Second molars.....thirteenth to fifteenth year.
Third molars.....after the eighteenth year.

Dentition.—It is claimed that the eruption of the teeth is a physiologic process and as such is not productive of harm. In normal well babies this is generally the case. There may be a slight fever and restlessness with loss of appetite, associated with the eruption of a tooth, but the disorder is usually very temporary in character. With delicate children, particularly in those who teethe late, as in the rachitic when several teeth are cut at one time, not a little inconvenience may be caused by dentition. Even these patients, however, rarely have grave digestive disorders. In a large experience with teething infants, I have known but three in whom convulsions were apparently directly dependent upon dentition. One of these was a rachitic institution child, who cut his first tooth at the ninth month, and with each of the three succeeding teeth, which were cut during the next three months, there were convulsions without any other signs of illness.

Temporary digestive disorders are of very frequent occurrence in this type of child, during an active dentition. The child may be restless and irritable and perhaps there is fever of a degree or two. His digestive capacity is lessened, but the usual diet is nevertheless continued. Fermentative diarrhea results, which may be, and often is, the starting-point of grave intestinal disease. When it is apparent that the child's generally good-natured daily habit of life is being unfavorably influenced by dentition, the food should temporarily be reduced, particularly if the weather is hot.

Breast babies may be given water before each nursing so as to reduce the capacity for milk. In the bottle-fed two or three ounces of the food mixture may be removed from each bottle, replacing the amount with boiled water.

That cough, respiratory and skin diseases are immediate results of dentition is without foundation. During active dentition when the gums are distended and swollen from pressure, relief will often be furnished promptly by rubbing through the prominent points of the tooth with a clean towel over the index-finger. Lancing alone may be performed, but unless the tooth is well advanced it is quite possible that the gums will reunite over the tooth, forming a cicatrix which will make the eruption more difficult than before. If a week or ten days' discomfort can be obviated by assisting a tooth through the gum, I fail to see any contraindication to such a procedure.

DAYS TO GO OUT OF DOORS; INDOOR AIRING

Physicians are frequently consulted as to the age when, and the conditions under which, it is permissible to take the baby out of doors. To answer this, the place in which the child lives, the season of the year, and the age and condition of the patient must be taken into consideration.

A child, regardless of its age, should never be taken out in inclement weather. If under one year, he should not go out if the temperature is below 20° F. During the midday heat of summer the baby is better off in the largest and coolest room in the house, or on a shady veranda. On very windy days the young infant should not go out, nor when the snow is melting in large quantities, but, although unable to go out on account of unfavorable conditions of the weather, there should be no lack of fresh air, and in such conditions children should be given an indoor airing. For this purpose the child is dressed as for the daily outing. All the windows of the nursery or some other large room are opened, on one side of the room only. The doors should be closed, so that currents of air are avoided. The child is placed in his carriage, suitably covered, and wheeled about the room for an hour or two. This, if done twice daily, answers almost as well as the actual outing.

This method will be found very useful in "winter babies"—those born during the late fall or winter months. The indoor airing may be given for a week or more, before he is taken out. By this means the child is gradually accustomed to a change of temperature from that of the average living-room to that out of doors, and will not be harmed when he is finally taken out. After an illness also, it will afford an earlier means of returning to the daily outing. This method of giving a child fresh air will be found useful with very delicate children also, who, by reason of their condition, may be unable to go out during the winter months, for several weeks at a time. There are, however, but few days during the winter that are too cold or too stormy for the indoor airing.

THE EXERCISE PEN

In another chapter, in speaking of "colds" and how children are exposed to the influences which might bring about what is known as a "cold," the custom of allowing a child to sit on the floor and play, at all seasons of the year, is referred to as a most frequent means of exposure. There is always a current of air near the floor, as one readily discovers by resting his hand on the floor, on a cold winter day; further, the floor of the average house is naturally the most unclean part of the dwelling. Here dust gathers and dirt from the street collects as it is brought in on the feet of older members of the family. On this necessarily unclean floor, the young child is permitted to spend a considerable portion of his waking hours. It can

readily be seen that countless numbers of bacteria may be transferred through the medium of the hands from the floor to the child's mouth. Rugs and pillows, which are sometimes used, while cleaner than the floor, are of little assistance in preventing drafts.

Exercise is very necessary for the child's proper growth and development. He must have an opportunity and place in which to creep, walk, and run. In order that he may have these advantages and not be subjected to unfavorable influences, I have found the exercise pen (Fig. 4) of the greatest service. After being bathed, dressed, and fed, the child is placed in the pen, on a rug or quilt. Toys are given him and the door is closed. He cannot come in contact with the stove, he cannot roll downstairs, and he is in no danger from the rough play of older children. He is given an opportunity for active exercise without a possible chance of injury.

The pen can be made of any size, but the usual size is four feet square. It can be made of any light-weight wood, pine generally being used. The legs of the pen should be at least twelve inches

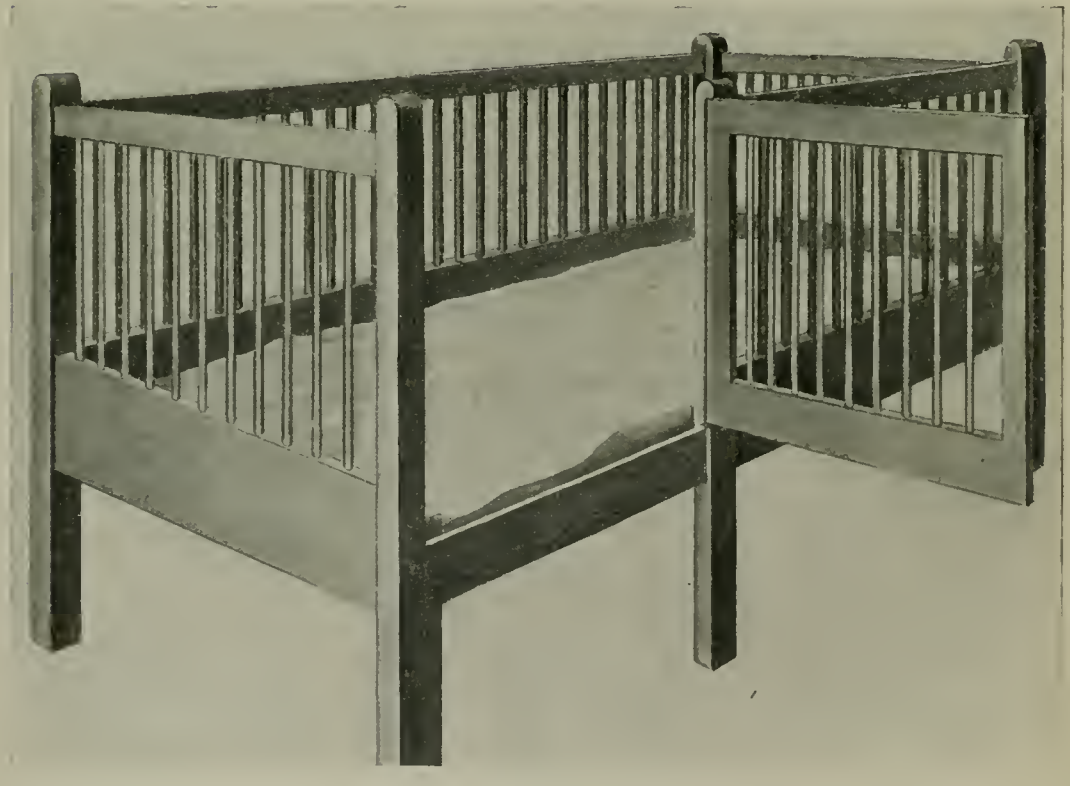


FIG. 4.—THE EXERCISE PEN.

long, bringing it well off the floor. The pen is so constructed that it may readily be taken apart and put together again, iron tenon hooks and iron mortices being used to hold the parts together. The floor may be made of any thin material. One-half inch pine boards nailed together, or papier-mache supported by narrow strips of board, may be used. The floor is supported by strips of board about one-half by two inches, which are fastened to the inner side of the

end-pieces. The pen is best placed in the corner of the nursery or the living-room. Its size may be determined entirely by the size of the room. During warm weather in the country, it may often be used out of doors.

THE FIRST EXAMINATION OF A PATIENT

Upon being called for the first time to see a patient, it is my custom in every case to take a history. On page 40 is a copy of the history record which I use. Form *A* represents the front of the slip. Form *B* represents the back of the same slip. Further records are kept on plain ruled sheets of the same size—5×8 inches.

When the history is completed the leaves are placed in a Moore's loose-leaf binder.

The patient's family history is carefully taken. The habit of obtaining a complete and accurate record as regards family peculiarities in relation to disease is often of much service, subsequently, if not at the time. Upon systematic questioning only will necessary facts be brought out relating to tuberculosis, rheumatism, syphilis, etc. The child's personal history includes the birth-weight, the rate of growth, the nature of previous illnesses, present weight, the condition of the skin, eyes, nose, heart, lungs, tongue, bowels, and the temperature. All these points are noted and recorded. It is only by such an examination, requiring much time and patience, that we are able to become thoroughly acquainted with the case in hand.

The child must be stripped for the examination when the conditions found are entered in the proper spaces in the history chart. After the family history has been taken and the general physical examination completed, we are in a position to devote ourselves to the present condition of the patient. After one has practised for a time, thoroughly examining every new case, he is not only impressed with its value as bearing upon the management of the condition in question, but is also impressed with the unexpected pathologic findings in other organs, particularly the heart, throat, and lungs. The habit of limiting the examination to feeling the pulse, which the doctor usually does not feel on account of the struggling child, and the examination of the tongue, which is usually alike unsuccessful, merits the severest condemnation.

WRITTEN DIRECTIONS

If possible, directions for the care of sick children should be given outside the sick-room, so that the physician may have the undivided attention of the mother or nurse. These directions should first be given orally and thoroughly explained, and then written out in detail. With the child crying, and two or three onlookers

HISTORY RECORD

FORM A

Date Address Name

Mr Age

Family History Children living Ch. dead Cause
Rheumatism Tuberculosis Syphilis
Nervous Dis. Alcohol, tea, etc. Miscarriages

Personal History child, born at Labor Wt. at B. lb.
Sat up at mo. Talked at mo. Teeth at mo. Walked at mo.

General Health and Habits
Appetite Eats between meals? Tea, beer, etc?
Bowels Bath. Fresh air
Sleeps from to ; and from to . Snores? Mouth Br.?

Previous Diseases Meas. Wh. Cg. C-Pox Scarlat. Diphth.
Mumps. Sm-Pox.
Gastro-enteric
Respiratory
Ear Throat Colds

Diet from Birth Nursed

Present History

FORM B

EXAMINATION

Weight lb. Height in. Circ. Head in. Circ. Chest in.
General Condition Color Muscles Reflexes
Mentality Sits? Walks? Talks?
Head Fontanel Sutures Cranio-tabes
Eyes **Nose** Disch. Breathing
Mouth Tongue Muc. Memb. Teeth
Throat Tonsils Adenoids
Lymph Nodes Ears Epitrochlears
Thorax Shape Rosary Groove
Heart
Lungs
Abdomen Umbilicus Liver Spleen
Genitals **Skin**
Extremities Epiphyses Contour Feet
T. °**P.** .**R** . **Blood** R.B.C. .Hb. %. W.B.C.
Urine React. S. G. Alb. S. Ind Mic. Exam.

talking, the mother or nurse becomes confused and is almost sure to misunderstand or forget important directions.

If there is not a trained nurse in charge the doctor should show the mother or nursery maid how to perform the various offices for the child. She can in a few moments be taught how to read the clinical thermometer, how to give a sponge-bath and an enema, and how to do many other things which the changed condition of the child requires. The use of a croup kettle, which may be needed for croup or bronchitis, should always be explained.

I have found the printed form as given below very useful not only in making the directions absolutely plain and unmistakable, but also as a great time-saving measure. The expense of printing is but a trifle. *Form A* represents the front of the slip. A few minutes is all that is necessary to fill in the blank spaces. *Form B* represents the back of the slip; on this the results of the preceding twelve or twenty-four hours are entered. One chart may be made to answer for twelve or twenty-four hours, and when the case is finished we have a complete record, secured with the expenditure of little time and labor.

FORM A.

Date Name Age Disease

ORDERS.

Food.
Temperature to be taken every . . . hrs.
℞ 1 every . . . hrs.
℞ 2 every . . . hrs.
℞ 3 every . . . hrs.
Whisky every . . . hrs.
Brandy every . . . hrs.
Steam Inhalations every . . . hrs.
using
Sponge Bath for . . . min. every . . . hrs.
at . . . °F., if Temp. reaches . . . °F.
Cool Pack to be given if Temp. reaches . . . °F., and continued until Temp. falls to . . . °F., using water at . . . . °F.

Spray Gargle Throat with
every . . . hrs.
Irrigate Throat with
every . . . hrs.
Irrigate Ear with
at . . °F., every . . . hrs.
Irrigate Colon with
at . . °F., every . . . hrs.
Counter-irritation with
Mustard . . . . parts
Flour . . . . parts
to every . . . hrs.
Give Enema of Soapsuds
Saline at . . °F.
at . . . o'clock if necessary.

FORM B.

Date

CLINICAL NOTES.

. . . . . hour.

Temperature °F. °F. °F. °F. °F. °F. °F.
Pulse
Respiration
Sleep
Skin
Tongue
Throat
Lungs

Heart
Abdomen
Nervous Symptoms
Special Symptoms

Nourishment

Vomiting
Stools no. in 24 hr.
character

Urine amt. oz. in 24 hrs.
Blood

TREATMENT OF THE INDIVIDUAL

In these days of specialization, in associating with medical men in consultation or otherwise, one is sometimes impressed with the fact that there is a tendency for the patient, the individual, to be lost sight of, to be overshadowed by the immediate disease or condition from which he may be suffering. In children the success of the treatment in practically every chronic ailment depends upon the vitality of the individual patient and his powers of resistance as a whole, to a much greater degree than is the case with the adult. The object of taking up this subject is not to be unkindly critical, but to call attention to one phase of the management of children which is not sufficiently appreciated by many who have to deal with them in their professional work. It is not at all infrequent to see poorly conditioned children who have been treated for months by local measures for a skin affection, recover without any local treatment whatever, other than an attempt perhaps to relieve the itching, when their lives are ordered according to the requirements of the growing child, as regards nutrition, bowel evacuation, sleep, suitable clothing, fresh air, and rational exercise. I have seen cases of chronic rhinitis and bronchitis which had persisted for weeks respond promptly when local measures, sprays and douches, and the internal use of drugs were suspended and the child's life directed along rational lines. Those who treat tuberculous and other chronic bone diseases, chronic otitis, chorea, and hysteria, are to be reminded that their work is not half finished when they have completed the usual daily or weekly routine treatment. In these chronic ailments it is folly to expect—what a cure really means—a constructive process on a destructive diet and improper habits of life. Children possess marked recuperative powers, and the rapidity of progress toward recovery is often most gratifying when right conditions are instituted, as relates to those fundamentals in child management; viz., food, sleep, clothing, and bathing. It is the height of folly to give children iron for anemia and allow them every form of indiscretion in diet. It should always be remembered that the best results are obtained in the treatment of a child, whatever the nature of his illness, when he has a child's normal existence, and it is only under such conditions that satisfactory results of treatment can be expected.

NECESSITY OF METHOD IN THE MANAGEMENT OF CHILDREN

Among the observations that have been made during my work in pediatrics among all types and classes of people I have been particularly impressed with the fact that some children are the source of an immense amount of trouble, while others of no better health or greater strength cause very little anxiety on the part of their parents. Children differ greatly as regards individual traits

and disposition, but these can be fashioned to a great extent by proper management. The more spirited the child, the greater need of method in its care. I know mothers who are worn-out, nervous wrecks for no other reason than a lack of system in the management of the daily life of their children. Thorough-going conscientious mothers they may be, but they represent that large number of mothers who have never been taught that certain functions and duties should be performed only at certain definite times every day. This subject is considered not from any moral standpoint but simply because of its bearing upon health.

Beginning with the baby at birth, he should be fed or nursed at definite times and at no others. Sleeping should never interfere with the nursing hours. The child should have its time for undisturbed repose and a midday nap should be insisted upon at a certain hour until the child is six years old. The definite time for meals, with properly selected food, should be continued throughout adolescence. The child should be bathed at a certain hour and aired at a certain hour. "Runabouts" should have their hours for play and should retire at a definite time every evening. Such a régime is conducive to perfect health, consequently to better growth and development and to a stronger manhood. It is idle to say that many parents, particularly among the poor, cannot conform to such requirements. The poor are just as anxious to do the best for their children as are the rich, and will do it to the best of their ability if the reasons for doing it are explained to them. If they cannot reach the ideal, they will attain to a higher degree of efficiency by striving for it. The trouble ordinarily is not with the mother, it rests more with the medical adviser, who is largely responsible for the ignorance of the mother and the resulting harm to her offspring.

THE SICK-ROOM

If there is a choice of rooms for the patient, as there is in many households, its size and means of ventilation are important points to be considered in its selection. During cold weather a room with southern exposure, to which the sun has free access, should be chosen. During the hot months of summer, however, the cooler the room, the better, provided the size and ventilation are satisfactory. The furnishings of the room should be of the simplest, only those articles of furniture being allowed to remain which are required for the patient. So many of the ailments of childhood are of an infectious nature that only articles of furniture should be used that can be washed. Curtains, hangings, and plush furniture have no place in a sick-room. A plain wood floor is much better than a carpeted one. Enameled beds, plain wood or enameled chairs and tables are best. A painted wall is much better than a papered one. A fireplace is desirable not only for heating purposes but also for

ventilation. The successful treatment of severe illnesses in children is often determined by the careful attention to every detail in the care of the patient. A child ill in a dirty, badly ventilated overfurnished, overheated room is from the first at a decided disadvantage.

The Window-board.—A convenient and simple means for ventilating the living-room, sleeping-room, or sick-room of a child is by what is known as the window-board. A plain inch board is sawed the width of the window-frame and placed under the raised window in the lateral frame groove resting upon the sill. This raises the top of the lower sash above the bottom of the upper one, leaving a space between, through which the air enters with the current directed upward. The board may be of any width—four, six, or eight inches. A width of six inches is commonly used. There are various ventilating devices in the market. Those that are of value are expensive, and their effectiveness over the simple means above suggested does not warrant the expenditure.

THE NEW-BORN

PREMATURE AND CONGENITALLY WEAK INFANTS

There are comparatively few infants born before the completion of the twenty-eighth week of pregnancy that survive the first year. Reported cases of survival of those born before that time are usually unreliable, as they seldom take the child beyond the third month. The prognosis is influenced by the factors causing the premature birth. If syphilis is present, the child may survive but a day or two. Children whose births are forced because of kidney disease in the mother do not appear to do as well as others. I have treated a large number of premature infants in children's institutions and have had anything but brilliant results with them. They not infrequently live to be two, three, or four months of age or older, but on account of their reduced vitality they readily succumb to the slightest ailment, a mild bronchitis or fermentative diarrhea being sufficient to terminate their existence.

In the management of the premature and delicate newly born there are three points to be considered—the air the child gets to breathe, the nourishment, and the maintenance of bodily heat. It is also to be remembered that we are dealing with an undeveloped body which is not ready for the environment in which it is placed. The premature baby should be handled only when necessary, and then in the gentlest manner. Bathing is often best omitted for the first few weeks, oil being used for cleansing purposes. Because of the undeveloped parenchyma of the lungs unusually good fresh air is required. Because of the undeveloped heat-centers the body-heat of these infants is quickly lost and must be maintained by artificial means. The stomach is small and the digestive processes are undeveloped and weak, so that the nourishment should be of the most easily assimilable character.

The maintenance of heat is of the utmost importance. For this purpose incubators and their various modifications have been used from time to time. My experience with incubators has been unsatisfactory. They may by careful watching maintain an even temperature, but all that I have used have been defective in supplying fresh air to the child. My incubator babies invariably have done badly. If the electrotherm (Fig. 5) is not at hand, the padded crib with the child wrapped in cotton and surrounded by hot-water bottles is the best means of maintaining the temperature. A thermometer should rest between the cotton and the bed-clothing as a guide to the nurses in the use of the hot-water bottles. Ordi-

narily this should register from 85° and 95° F., depending upon the temperature of the child, whose rectal temperature should at first be taken frequently. If there is a tendency for his temperature to be greatly reduced—below 95° F.—more external heat will be necessary than if the temperature were 97° or 98° F. The best device among those which I have had an opportunity to observe for maintaining artificial heat is the electrotherm advocated and described by Holt, "Diseases of Infancy and Childhood," 1906.

"These small heaters are attached to an electric fixture, like a drop-light. A convenient size is from ten to fifteen inches. It is placed between two or three thicknesses of blankets, upon which the infant lies in its basket or crib. The degree of heat can be regulated according to the amount of electricity turned on. This mode of handling premature infants has been given thorough trial at the

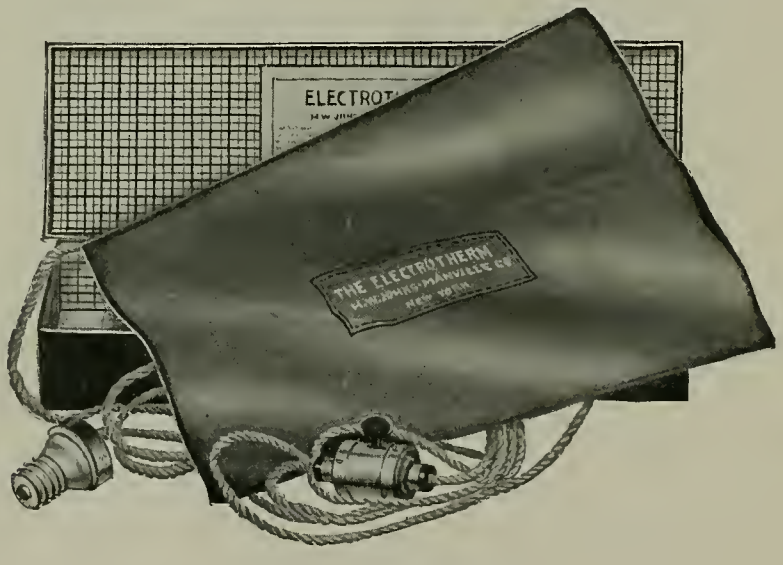


Fig. 5.—Electrotherm.

Babies' Hospital and has been found to fulfil the indications, with children as small as three pounds and as young as seven months, quite as well as the incubator, while at the same time being free from its dangers. It has not been necessary to raise the general temperature of the room. These patients when kept in the wards at an ordinary temperature have maintained an even bodily temperature much more uniformly than with any other method I have seen, the incubator included."

A mistake often made in the management of premature and delicate infants is that of providing too warm air for respiration, a glaring defect in most incubators. The best means of decreasing a delicate child's vitality and resistance and increasing his chances of pulmonary infection, is to supply him constantly with air at 80° to 90° F. In a modern house the maintenance of this temperature usually means an absence of change of air and an abundance of

bacteria. The patients do best when the temperature of the air they breathe is from 70° to 72° F.

Breast-milk for premature infants born under twenty-eight weeks is almost a necessity, and should always be procured when possible for all premature children. The mother, with the rarest exception, is unable to supply it, so that a wet-nurse should be secured. In selecting a wet-nurse for a premature baby it is advisable to take the wet-nurse's baby also, as the premature infant may not be able to nurse, or if he nurses he will not take all the milk. Pumping the breasts of a wet-nurse will almost invariably dry them up, if her own baby is not with her to furnish the necessary stimulation of nursing. Sufficient milk may be removed by the breast-pump to supply the premature infant if he is unable to nurse, and the wet-nurse's baby will empty the breast. For premature babies who refuse the breast or are unable to take a nipple, the Breck feeder (Fig. 6) may be used as a means of giving nourishment, or gavage (page 141) may be brought into use. This I have been obliged to resort to in several cases. The Breck feeder consists of a graduated glass tube, narrowed at one end. Over this end is placed a small rubber nipple, the other end being closed by a flexible rubber cap. Drawing on the nipple is aided and encouraged by pressure on the air-filled cap. If the breast-milk proves too strong it may be diluted with equal parts of a 6 percent sugar solution, from one-half to one ounce of the mixture being given at first at intervals of from one to one and one-half hours. Fourteen to fifteen feedings may be given in the twenty-four hours, the amount depending upon the child's digestive ability. If human milk is not obtainable, whey made from whole milk may be given, the nutritional equivalent of which is approximately 1 percent fat, 1 percent proteid, 5.5 percent sugar, or one ounce of gravity cream may be given with one ounce of milk-sugar and fifteen ounces of water, which gives a nutritional equivalent of 1 percent fat, 5 percent sugar, and .3 percent proteid. Canned condensed milk, one part, to 24 to 30 parts of water, may be used with advantage as a temporary feeding measure when nothing better is available. The food strength is increased, the intervals made longer, and the feedings larger, as the patient proves able to assimilate the food.

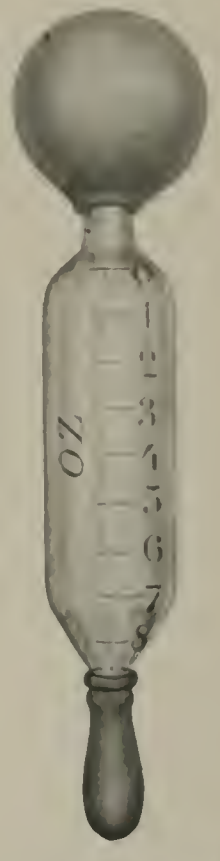


Fig. 6.—The Breck Feeder.

The premature child requires unusual advantages, and even when but one month premature, rarely "catches up" during the first year, sometimes not for two or three years.

ASPHYXIA IN THE NEWLY BORN

The first step in the management of asphyxia in the newly born baby is to clean the mouth and throat of the mucus which will almost invariably be found there. This is best done by using as a swab the index-finger wrapped with dry absorbent cotton or sterile gauze. Spanking the child or the alternate use of a hot (110° F.) and cold (60° F.) bath, the child being rapidly transferred from one to the other, will often stimulate respiration by inducing the child to cry. When these methods fail, inflation of the lungs by the mouth-to-mouth method may be attempted. Various other methods of inducing respiration have been advocated from time to time. The most effective are those of Laborde, Dew, and Schultze. The Laborde method consists in making rhythmic traction on the tongue, from twelve to fourteen times a minute, which it is claimed excites respiration. The Dew method consists in grasping the infant by the back of the neck with one hand and by the knees with the other. The upper and lower portions of the child are then approximated by a flexion of the thorax on the abdomen; the reverse movement—extension—should also be used, and thus alternate flexion and extension are practised fifteen to twenty times a minute. Schultze's method is described by him and quoted by Edgar as follows: "The child lying upon its back is grasped by the shoulders, the open hand having been slipped beneath the head. The last three fingers remain extended in contact with the back while each index-finger is inserted into an axilla, the thumbs lying upon and in front of the shoulders. When the child thus held is allowed to hang suspended, its entire weight rests upon the two fingers in the arm-pits. It is now swung forward and upward, the operator's hands going to the height of his own head; the pelvic end of the child rises above its head and falls slowly toward the operator by its own weight, flexion occurring in the lumbar region. The thumbs in front of the shoulders compress the chest while the hyperflexed lumbar vertebræ and pelvis compress the abdomen and through it the thorax; finally, the last three fingers on each side compress the thorax laterally. As a result of this manœuver, when properly done, aspirated secretions flow abundantly from the mouth. The distended heart also feels the compression which forces the blood into the arteries. The child is now swung back into its original position and supported entirely by the fingers in the axillæ. The compression of the thumbs and last three fingers is removed. The downward swing elevates the sternum and ribs, while gravitation and the traction of the intestines depress the diaphragm. It is often possible to hear the air rush into the infant's glottis as it reaches the original position, although this can occur in a cadaver. The amplification of the thorax lowers the intracardiac pressure. The child should be

swung up and down ten times for the space of a minute. The effects of the manœuver should be as follows: The heart-beat increases in frequency, the cadaveric pallor of the skin becomes replaced by a rosy hue, and the muscular tonus appears. The child is then placed in a warm bath and watched. If the inspirations are superficial, a momentary dip in cold water is indicated. If the heart-action becomes poor the child should be swung again. If prolonged swinging becomes necessary, the root of the tongue should be compressed forward in order to raise the epiglottis and permit the removal of secretions with the fingers. In premature children the thoracic walls are often too soft to benefit by the compression of the fingers. In these cases insufflation of air should be practised."

It is not well to rely upon one method. If necessary, different means of inducing respiration may be attempted in a given case. The introduction of a catheter or instruments into the larynx has not met with favor from obstetricians.

SEPSIS IN THE NEWLY BORN

The newly born infant is peculiarly susceptible to infections, particularly with the pyogenic bacteria. The avenues for the entrance of bacteria into the body are many, and the resistance at this period of life is very slight. Infection may be either through the mouth, which is probably the most frequent portal of entry, or through the nose, the skin, the rectum, the conjunctivæ, the urethra, the umbilicus, and, in girls, the vagina. Almost any portion of the body may be the seat of the infection. It is rare, according to the cases upon which I have made autopsies, to find only one organ or structure affected. Usually two or three or more portions of the body are involved in the septic process.

The management resolves itself into relieving the system of the infection, as is possible when its seat of operation is the skin in multiple abscess formation; incision should be made and followed by a wet dressing of a saturated solution of boric acid, or, if the area is not too large, a 1:5000 solution of bichlorid. If the site of the infection is at the umbilicus, the suppurating surface should be thoroughly cleansed and kept covered with a wet dressing of 1:5000 bichlorid, which should be changed at least every two hours. If there is erysipelas, an ointment composed of 30 percent ichthyol in vaselin makes the best dressing. This should be freshly applied every four hours. The septic infant, whether the infection is mild or severe, usually nurses very poorly. Oftentimes both breast and bottle are refused. When a sufficient amount of fluid is not taken, plain boiled water or sugar-water, 5 per cent, or completely peptonized skimmed milk, may be given by gavage. If fluids are not given, the child is very apt to develop inanition fever, which, added to the infection, makes a serious condition more serious. From two to four ounces of a normal salt

solution used lukewarm, injected into the descending colon through a catheter, will often be retained with beneficial results. It should not be repeated oftener than once in six hours.

Medication other than small doses of alcohol—five drops of brandy, well diluted, every hour if necessary—has been without avail in my cases. The prognosis at best is very grave, although when the vital organs are not involved, cases occasionally recover.

An unusual case of infection which ended in recovery occurred in my private practice. The child had no fever, but lost rapidly in weight. There was marked prostration. The skin took on a greenish hue and we were at a loss to discover the cause of the illness. The infection was suspected, but no portal of entry could be found, neither could we find any localized process until the nurse discovered that the umbilicus and the skin about it were bathed in pus. The umbilicus had apparently healed without any indication of local trouble. Investigation showed, however, that the infection had entered at this site, and extending along the vein or artery, had become pocketed and formed an abscess one and one-half inches deep. Enlarging the opening at the umbilicus and establishing free drainage were followed by a gradual closure of the abscess cavity and recovery.

CEPHALHEMATOMA

A cephalhematoma is a blood tumor situated between the pericranium and the exterior of one or more of the bones of the skull. The tumors vary considerably in size, are readily recognized, and are situated at the site of the caput succedaneum. In a small proportion of the cases an internal tumor occurs at the same time, the effusion taking place between the dura mater and the skull. Very rarely suppuration occurs in the tumor. I have seen two cases of this nature, both of which recovered under incision and antiseptic dressings. If there is an internal effusion the case will be fatal. One of these has come under my observation. The usual course, when the tumor is external, is for it to be absorbed without treatment.

ICTERUS NEONATORUM

Jaundice occurs in about one-third of all infants. It usually makes its appearance on the second or third day and lasts from a few days, in mild cases, to a week or ten days, in severe. Its effect on the child is practically *nil*. At the New York Infant Asylum the records show that the icteric infants thrive as well as those who are entirely free from the complaint. It is well in these infants to keep the intestinal tract active. If the bowels do not move freely, twenty drops of castor oil should be given and repeated in twenty-four hours, if required.

UMBILICAL POLYP

An umbilical polyp is usually the result of an overgrowth or an outgrowth of a neglected granuloma. The mass, which may vary in size from a flaxseed to a pea, is reddened, moist, and usually bathed in a viscid muco-purulent secretion. There is often considerable excoriation of the skin about the umbilical opening. Sometimes the mass is so small that it is hidden by the overlapping folds of skin, and its presence would not be suspected but for the secretion which keeps the parts moist. The polypi are very vascular. Cutting the pedicle and applying nitrate of silver or carbolic acid is not a safe procedure. I have known severe hemorrhage to follow such treatment. About ten years ago I was obliged to sit for three hours by the side of a crying, wriggling child making pressure on the cut stump of an umbilical polyp, after a colleague had cut the pedicle. In no other way could the hemorrhage be controlled. The best means of management in these cases is to ligate the pedicle and allow the polyp to wither and drop off. The powder referred to under the head of Granuloma should be applied after the ligature is fixed, and reapplied frequently before and after the polyp has dropped off, and continued until the wound is cicatrized and dry.

ATELECTASIS

Atelectasis may be present in the newly born who come into the world asphyxiated, and it is not infrequently seen when there has been a prolonged difficult delivery. It may be the result of weakness, pure and simple, and is not of unusual occurrence in the premature. For some reason there is a failure or inability to dilate the air-vesicles. I have seen sudden collapse occur in marantic infants, the child dying in a few moments with cyanosis and orthopnea, the autopsy proving the diagnosis of atelectasis. The condition may be produced also through compression of the lung with exudation in pleurisy or by the obstruction of a bronchus with mucus. The most dangerous types are those in which it is present in the newly born and when it occurs in the weakly during early life. The warning of its presence is usually in the form of cyanosis with rapid superficial breathing with or without convulsions.

The management of atelectasis in the newly born, who come into the world asphyxiated because of prolonged difficult delivery or when it is the result of weakness, is to make the child cry lustily. If auscultation over the lower lobes posteriorly does not show free vesicular breathing, the child should be made to cry every day, either by spanking, or by plunging him first into water at 110° F. and again into cold water at 60° F., our object being to induce vigorous crying and thus dilate the air-vesicles. A case under treatment at the present time is making satisfactory improvement by inhaling

oxygen for one minute out of every fifteen, with stimulation of various kinds to make him cry. Atelectasis from obstruction of a bronchus or from compression is usually readily relieved when the source of the trouble is removed. In out-patient work we occasionally see marantic young infants in which there is an involvement of a considerable area of one of the lower lobes posteriorly without any sign whatever of discomfort. The process of resolution in these cases is very slow, from the periphery toward the center. The condition is probably of much more frequent occurrence than is generally supposed, if we are to judge from the autopsy findings in young infants, particularly in institutions.

MASTITIS IN THE NEWLY BORN

Inflammation of the breasts in the newly born, both in the male and in the female, is seen with considerable frequency in out-patient work. The mammary glands may be swollen to several times their normal size and acutely tender. These glands, in young infants, should not be pressed nor manipulated in any way, more than is required for cleanliness. Not a few of my out-patient cases of mastitis have been due to the attempts of the midwife to express the milk from the breasts. The cases are explained by the fact that the opening of the nipple is large and the gland readily becomes infected from unwashed hands or unclean wearing apparel. My cases have usually responded well to the application of ichthyol 25 percent in oxid of zinc ointment, U. S. P. The ointment is spread generously upon old linen, which has been boiled and dried, and is then gently bound upon the inflamed gland. Over this is placed oiled silk to protect the clothing, and, over all, a gauze bandage is applied with very light pressure. The dressing should be changed and fresh ointment applied every six hours. Wet dressings in the management of this condition in infants is not advised. In four of my cases the mastitis was beyond control when first seen and suppuration of the gland—mammary abscess—followed.

Mastitis in Young Girls.—Inflammation of the mammary gland in young girls is a comparatively rare condition, but one of sufficiently frequent occurrence to require mention. Swelling and tenderness of the breasts are often complained of by young girls about the time of puberty, but they subside without treatment if let alone. Mastitis is usually due to the entrance of bacteria through the nipple, and in its clinical manifestations it resembles mastitis in the adult, except that the entire gland is usually involved, becoming swollen, tender, and excruciatingly painful. Two of these cases have been under my care during the past year; one in a girl of thirteen, the other in a girl of seven years. Both cases responded to the use of an ice-bag during the acute stage, which was kept constantly applied during the waking hours. At night a wet dressing of bichlorid of mercury, 1:5000, was kept on the infected glands. There

was moderate fever, headache, and lassitude in both patients. Each was given a saline laxative in the form of citrate of magnesia, and a diet of broth, gruel, toast, and stewed fruit. This diet was continued during the period of fever. In one case recovery occurred in five days and in the other in seven days.

Mammary Abscess in Infants.—Mammary abscess is the result of a mastitis which failed to undergo resolution. It occurs as frequently in males as in females. All of my cases were seen in institutions or in out-patient work. In four, the abscess developed under my own observation. In a female child, a patient at the New York Infant Asylum, both glands were entirely destroyed. As soon as pus is discovered the abscess should be incised and drained, with a view to saving as much of the gland as possible. Of course, this advice applies particularly to a female patient. Wet dressings are not applicable in cases of young infants when the parts covering the thorax or abdomen are involved. It is my custom to protect the skin from infection by the use of a 10 percent boric acid ointment in cold-cream as a base. This is applied on old linen about the abscess opening. The dressing should be changed three times daily.

UMBILICAL GRANULOMA

A granuloma at the umbilicus consists of a reddish secreting mass of granulations comprising the umbilical stump. It may vary in size from the head of a pin to a pea. Granulomata usually occur in cases in which the care of the cord has been neglected. In out-patient work they are very frequently seen, and occur usually in children who have been delivered by midwives. The mother brings the child to the dispensary with the story that the navel will not heal.

The granulations are very vascular and bleed readily. After thoroughly cleansing the parts, one or more applications of a 50 percent nitrate of silver solution, followed by the free use of an absorbent dusting-powder, soon produces a normal cicatrix. A powder of the following composition is recommended:

℞. Acidi salicylici.....gr. xv
Acidi borici.....gr. xxv
Pulveris zinci oxidi
Pulveris amyli.....āā ʒj

The powder should be applied very freely at two-hour intervals during the day, or at least often enough to keep the wound dry.

HEMORRHAGIC DISEASES OF THE NEWLY BORN

A considerable number of these infants have come under my observation at the New York Infant Asylum. In describing the condition it would seem unnecessary to continue an irrational

nomenclature still in use, based upon the location of the hemorrhage, or the name of the physician who is believed to have given the first description of a symptom-complex which is supposed to characterize the disease. I have seen hemorrhages in the newly born occur from nearly every portion of the body and into most of the internal organs. In a recent case a colored infant bled to death in the pericranial tissues without a sign of hemorrhage elsewhere. I have seen fatal hemorrhages from the navel which we were not able to control. In one case a hematoma appeared on the dorsal surface of the right foot, from which the blood oozed continuously. This, with hemorrhage from the intestine, terminated the case in three days. In two cases in which the hemorrhage was limited to the gastro-intestinal tract, the hemorrhage ceased in twenty-four hours after the administration of lactate of calcium in two-grain doses at five hour intervals. This treatment is worthy of further trial. Syphilis and hemophilia play an insignificant part in causing the hemorrhage. Sepsis is a broad term that covers the etiology of these cases. Oftentimes there are other proofs of the infection aside from the hemorrhage. Because infections differ in degree, nature, and field of action does not necessarily call for a typical description of each form of infection, and with our limited knowledge of the infectious process which may cause the hemorrhage, this is impossible at the present time. Without doubt, different forms of infection may enter the circulating medium of the new-born with a result in hemorrhage. The cases resemble hemophilia in the persistence of bleeding, while infrequently disproving its existence by making a complete recovery. The use of styptics and astringents for controlling the hemorrhage is useless. The only measure that has assisted me in any way has been the application of pressure to the bleeding parts, and this is not possible in many situations. Adrenalin, locally or by internal administration, has not been of any appreciable service. Our best results, which were by no means satisfactory, were obtained by attention to the gastro-enteric tract and in supplying the best possible means of nutrition.

Illustrative Case.—One of the most important contributions to the literature of hemorrhage in the newborn was reported in the *Medical Record* of May 30, 1908, by Dr. Samuel W. Lambert, of New York City. The patient was a girl born at term and weighed eight pounds and twelve ounces. Five hours after birth the cord was retied because of a slight oozing from the cut end. Twelve hours after birth a thickened, dark-colored clot was noticed in the right side of the tongue which was thought to be a nevus, but which cleared up later, proving that it was a hematoma. Three hours later the temperature was 102.2° F. The following morning the temperature was 102° F. The child looked pale and a slight amount of blood was found in the mouth. During the day her temperature arose to 103° F. and to 104.4° F. the next morning at 2 A. M. She be-

came paler and began to bleed slowly from the nose. A hematoma appeared in the scalp behind the left ear. The subcutaneous bleeding continued and extended down the neck over the muscles across the median line to the other ear, across the coronal suture over the frontal bone, and forward under the left ear to the angle of the jaw. Blood now appeared in the stools. The bleeding from the nose was continuous and quite profuse. During the following two days the bleeding continued in spite of the administration of calcium lactate and other measures.

On the fourth day the baby's skin was waxen-white. The mucous membranes were colorless. The nasal bleeding continued and the case seemed hopeless. Both the vomited matter and the stools contained blood, dark colored and bright red. The hematoma on the scalp increased and closed the right eye. Ecchymotic spots appeared on the legs.

At this time it was decided to resort to direct transfusion of blood from the father of the infant by end-to-end anastomosis of the two blood-vessels, after the manner devised by Carrel, of the Rockefeller Institute. This was done through the skilful surgical manipulation of Carrel himself, and Geo. E. Brewer. "The right popliteal vein of the baby was sutured to the left radial artery of the child's father, without anesthetic to either patient, and enough blood allowed to flow into the baby to change her skin from a pale transparent whiteness to a brilliant red color. No measure of the amount of blood was possible, but the evidences of a sufficient quantity were manifold. She began to cry lustily and to struggle against the bandages which held her strapped to an ironing-board. The wound in the leg up to this time had oozed a slight amount of pale watery blood, which did not clot well. It began to bleed freely and the blood promptly clotted. The nosebleed stopped instantly. The pulse became full and strong and slowed down, and the respirations were deep and full. As soon as the wound was sutured and dressed, the baby was fed an ounce of milk, which she took ravenously and retained, and immediately went to sleep.

"Since the ending of the transfusion there has been no hemorrhage, no vomiting, and no diarrhea. Convalescence from the operation was uninterrupted except for a slight infection of the wound. There was no evidence of hemolytic action at any time, and all the symptoms of melena ceased at once. The next morning the baby was found to be fourteen ounces below her birth-weight. She has gained steadily since, and now, eight weeks after birth, she weighs ten pounds, fifteen ounces. The hematoma was absorbed rapidly, except for a slight discoloration of the upper lid of the right eye, which still persists. The stools became of normal character two days after the operation. The wound is healed, and the child appears to be a normal child of its age to-day. The striking thing in

the case is that the disease ceased suddenly, and the child has been cured from the moment of the transfusion of blood."

After reviewing the literature and commenting on the different theories relating to etiology and pathology, Lambert concludes as follows:

"To review the facts of the case: Hemorrhages and fever began simultaneously, normal temperature was reached forty hours after the onset of fever, but the hemorrhages became progressively worse for three days after all fever had disappeared. At the time of operation the baby was in a dying state, and had palpably only a few hours to live. Immediately afterward the baby was in perfect health. There was no period of convalescence.

Such a sudden change in condition could not be due to a structural regeneration in the capillary vessels nor to a sudden overcoming of an infection; clinical experience will permit of no such inference. Neither the crisis of a pneumonia nor the relief of a spasmodic croup can be compared wtih the observed fact in this case, either from the point of view of reversal of pathological condition, or of lapse of time necessary to bring it about.

The only possible explanation of so rapid a change must be found in a chemical condition of the blood. And the final conclusion as to the nature of the disease is that melena neonatorum is a congenital malformation of the blood of unknown chemical nature. The solution of the problem of its etiology is to be found in a chemical study of the processes of osmosis in the capillary vessels, of the chemistry of blood coagulation and along kindred lines, which are for the most part new and untouched."

TETANUS NEONATORUM

Tetanus in the young infant is fortunately of very infrequent occurrence. From the second to the ninth day is the usual period of the development of the disease, although it may appear as late as the fourth or fifth week. Recovery is the exception. But few cases live longer than the second day of the illness. The treatment is by the use of sedatives such as chloral and the bromids. One grain of chloral every two hours appears to exert some temporary benefit. Large doses of bromid of soda—eight to ten grains—administered by the rectum every three hours in mucilage of acacia have given good results according to some observers. Tetanus antitoxin has not been used in a sufficient number of cases to establish any facts relating to its value. The nutrition of the patient is best maintained by the use of peptonized milk given by gavage.

The cord stump should be cauterized in order to destroy any tetanus bacilli which may be present and a wet dressing of 1 : 5000 of bichlorid of mercury kept constantly applied.

NUTRITION AND GROWTH

The fundamental principles in the life of the young of all animals are growth and development. This statement applies to the young of the lower animals as well as to man. Nature has fixed and definite laws in accordance with which this growth and development proceed. The type of animal produced depends in no small degree upon the way we follow out Nature's laws.

Heredity is, of course, an important factor, but environment counts for more. The young of the lower animals or of man may possess all that can be desired in the way of heredity, but if the early management of his life is faulty, an adult is produced which is almost certain to fall short of the normal. On the other hand, another, without the benefits of a good heredity, when given the advantages of faithful scientific care may produce an adult decidedly superior in all respects to those more fortunate in birth. I have seen this demonstrated time and again, both in the lower animals and in man. From my earliest recollection I have carefully watched the growth and development of animals. By observing care as to feeding, housing, ventilation, cleanliness, and exercise, I have seen animals which promised but little at birth develop into perfect mature specimens of their kind. During the past twenty years I have been intimately associated with thousands of infants and growing children in private, in hospital, and in out-patient work. The possibilities of proper growth under good management when little was to be expected, judging from the original condition of the patient, have been impressed upon me repeatedly.

The child is here through no choice of his own. He is to have a future. His health, vigor, powers of resistance, happiness, and usefulness as a citizen are determined in no small degree by the nature of his care during the first fifteen years of life. He has a right to demand that such care be given him as will be conducive at least to a sound, well-developed body, and this should be our first thought and object regarding him. Consider for a moment the number of occupations, other than the army and the navy, which require physical fitness before a candidate is accepted. Competition is keen at the present time and will be keener in the future. Employers of men and women, whether in the office, the factory, or on the farm, cannot afford to employ the physically weak.

The most important factor in the making of men and women is nutrition. It requires no great power of reasoning to appreciate the fact that the child who is fed on suitable food will become a

more vigorous, better developed adult than one who, beginning with his birth and continuing throughout the entire period of his growth, is given only food possessing indifferent tissue-building qualities. Next in importance to food, and following in close succession, are fresh air, cleanliness, cheerful surroundings, and healthful amusements, together with an absence of work of an arduous nature, whether in school or at service. That the offspring of man suffers more from nutritional errors due to the lack of suitable care than do the young of the lower animals is lamentable, but it is a fact nevertheless. The absence of thought and care and of knowledge relating to children is due to the fact that the child as such has apparently no intrinsic value in dollars and cents, whereas the young of the lower animals are no small part of their owner's material possessions.

Success in the management of children, nutritionally and otherwise, means daily attention to detail. Feeding the child properly one or two months out of the year is of little value. He should be fed properly every day in the year, for under normal conditions every day is a day of growth. Another factor having a deterrent influence upon the development of children is their unfavorable start during the first year. Unfortunately many mothers cannot supply to the infant the nourishment to which he is entitled, and this brings us to the matter of substitute feeding, fraught with its perplexities and uncertainties in the most competent hands, and with its dangers and disasters with the incompetent and inefficient. In the chapter on Substitute Feeding in infants their nutrition is considered in detail. It is sufficient to remark here that Nature has provided for the baby a food which contains the nutritional elements, fat, sugar, and proteid, in fairly definite proportions and in peculiar forms. Success in substitute feeding depends upon our ability to supply in suitable forms, and the child's ability to assimilate, a food containing approximately the quantities of the nutritive elements found in human milk. An exact reproduction of mother's milk by the use of cow's milk or other food is, of course, impossible. We can imitate it, however, with sufficient accuracy to make it an acceptable and sufficient food for most children who are deprived of the breast. After the nursing or the bottle age, the feeding must not be left to the family judgment, for at this rapidly growing period suitable nutrition is most important. Left to the family, the diet during the second year is very apt to consist of milk, which in large cities is often of uncertain nutritive value, together with insufficiently cooked cereals, boxed breakfast foods, bread-stuffs, crackers, and cake—often procured at the grocer's or baker's. At the out-patient departments of the New York Babies' Hospital and the New York Polyclinic Medical School only 20 percent of the children treated who are over one year of age are of normal development. In those under one year of age, only 35 percent are normal. While these

children are not to be considered as representing the country as a whole, still they do represent a large part of the population of our larger cities. These children are the offspring of day-laborers, drivers, waiters, and small wage earners generally. They have been fed in the manner above described, not because of poverty, but because of an absence of the slightest knowledge on the part of the parents regarding suitability of foods. Their children were not hungry, they were fed to satisfy the appetite, but when that was accomplished the parents considered their duty done. To feed with a definite purpose—with a view solely to the physical development of their children—had never entered the minds of the parents, yet most of them could read and write and possessed a fair degree of general intelligence. They were conversant with affairs and had attended the public schools, but were absolutely untaught as to how they should live.

The diet during this period of child life should be highly nutritious, and, in order to be properly digested, food should be given at definite intervals. It should be well cooked and properly seasoned. The habit of allowing children to eat between meals cannot be too strongly condemned. It not only spoils the appetite for suitable food at regular hours, causing children to crave delicacies, but prevents the most complete digestion and assimilation. The active "runabout" child and the school-child require a high proteid diet. It should consist of red meat, never oftener than once daily, poultry, fish, eggs, milk, butter, cream, whole-wheat bread and cereals, such as oatmeal, cracked wheat, cornmeal, and hominy. Other cereals may be used for the sake of variety. Each cereal mentioned should be cooked three hours the day before using. It may be claimed that the prolonged cooking is impossible to secure. It is done, however, in dozens of families under my professional care. Green vegetables and stewed and raw fruits are important adjuncts to the dietary. Dried peas, beans, and lentils in the form of a puree are valuable articles of nutrition because of their large percentage of vegetable proteid, and they are particularly useful in children with a rheumatic tendency, in whom the use of red meat must be curtailed. For details in diet at this age, see p. 138.

Doubtless the next most important factor after food and the means of giving it, is good air. It is a just criticism of the average American that he is afraid of fresh air, not only by night but by day, and it is one of the most difficult features of a child's management with which I have had to deal. Mothers will feed the children in detail according to instruction. They will bathe them and follow out to my satisfaction every order and direction. The stumbling-block is the open window. If the mother opens it as directed, the grandmother or some other member of the family appears on the scene and closes it. The window-board (page 44) and other means of ventilation on the market have their uses. The window-board in

my hands has been most satisfactory. It is to be hoped that a knowledge of the means and results of treating tuberculosis by open-air methods, and the recent agitation concerning the treatment of pneumonia and other infectious diseases along similar lines, may so permeate the minds of the masses as to quiet their fears regarding dangers of outdoor air.

In my own experience I have been able to secure an ample supply of fresh air either by the window-board, already referred to, or the open fireplace. When the child is out of the living-room or nursery, the room is ventilated by opening all the windows, when family conditions allow, the nursery always being aired in this way. The sleeping-room should always be aired for one hour before the child is put to bed. Indoor airing (page 37), for which the child is dressed as for going out, placed in his carriage or cart, and wheeled up and down the room for an hour or two with the windows wide open regardless of the weather, is most satisfactory in very young and very delicate children, and during convalescence from illness. On very inclement days the child accustomed to his daily outing will be greatly benefited by the indoor airing.

With bathing we have less to complain of. The necessity for the daily bath is appreciated and acted upon by nearly all classes of society. From the time the cord falls and the cicatrix forms, the well infant and child should have one tub-bath daily. If he is too ill for the tub, he is not too ill to be sponged. The well child is naturally good-natured and happy. When such is not the case, we have not a well child to deal with. Something is wrong. Oftentimes it is the home management. Adults often forget that exuberance of spirits and thoughtlessness belong to childhood. Persistent child-nagging becomes a habit with many parents and teachers; in fact, irritable mothers usually have irritable children. Work involving strain, whether physical or mental, should form no part of the life of the child. In our modern school system the forcing process, the competitions, the giving of rewards of merit, are all of them pernicious practices. As a result of the competitive system, progress, to be sure, is made along intellectual lines, but at the expense of the physical, and what does intellectual attainment count for in a weakly or diseased body? A child cannot do hard mental work, such as is required of many children from the tenth to the fifteenth year, and be expected at the same time to develop to the best advantage physically. The appetite and digestive powers, the capacity for taking and assimilating food, are diminished as a result. I have seen it in hundreds of cases. On the streets in New York two pictures always fill me with pity—one is the pale, slender schoolgirl struggling home with a load of books. Such a child who came to me during the past year had eleven text-book studies besides piano and dancing lessons! When the question is asked the child

or the parents as to the why of all this work and worry and the close confinement which it entails, the reply almost invariably is that all the girls of her age do the same and she does not want to be behind. The other picture is the "little mother,"—a pale, wan, tired child from seven to twelve years of age who "minds the baby" and the other younger members of the household while their mother is away from home or at work. Children so abused are happily growing fewer, owing to various factors which need not be discussed here. It is needless to say that neither type of child makes the ideal woman or mother in any station in life. The condition of boys who work in factories, sweat-shops, or elsewhere is no better. When too much energy is expended in work, it cannot go to the building up of a strong normal body. The State is the loser and the child is robbed of his birthright.

It is the duty of physicians having children under their care to explain in detail to parents their responsibility as regards the physical welfare of their children. Parents, as a rule, are ignorant as to a child's management; but they are anxious and willing to do the best things possible for their children, and will carry out suggestions if we take the trouble to enlighten them as to their errors.

GENERAL PROPERTIES OF FOODS

Substances used as foods, regardless of the animal which they may nourish, possess the common property of being composed of fat, proteids, carbohydrates, mineral substances, and water in varying proportions. The purposes that these serve in the animal economy are essentially the same in all forms of animal life. In order to determine the food-value of any substance, a chemical analysis which shows the quantities of these nutritional elements is required. It will be found that foods varying widely in appearance and physical properties are still similar in that they are composed of the same food elements, although in different proportions.

Foods used to sustain animal life in any form must contain the ingredients needed by all animals, and they must be present in a form suited to the particular kind of animal to be fed, whether it is man or one of the lower animals.

The Ingredients of Foods.—All foods are composed of fat, carbohydrates, proteids, mineral substance, and water, but these elements exist in widely differing forms. Fat may be supplied in meat, cream or milk, butter, oleomargerine or butterine, lard, olive oil, cod-liver oil, linseed oil, cottonseed oil, etc. Carbohydrates may be furnished in the form of cane-sugar, milk-sugar, maltose, and dextrose—soluble products derived from starch, cornstarch, wheat or other flour, oatmeal, rice, hominy, bread, potatoes, etc. Proteids are secured in the form of lean beef, lamb or pork, chicken, fish, the gluten of such cereals as wheat and oats, and also in large quantities

from peas, beans, lentils, and other legumes, from the curd of milk, and also from eggs. The mineral substances of food are found combined with the other ingredients in the form of lime, phosphates, magnesium, etc.

The Function of the Food Elements.—The proteids of the food are used to form the bodily structures and to replace tissue consumed by the vital processes and excreted as urea. The vital processes, such as the circulation of the blood, respiration, and contractions of the muscles, call for energy, and this together with bodily heat must be supplied by the fats and carbohydrates. The mineral substances are used in the formation of bone and teeth, while the water serves to dissolve the food elements after they have been digested and to carry off waste products.

The Advantage of a Knowledge of the Composition of Foods.—Inasmuch as each food element has a special function to perform, and since growth is impossible without a sufficient supply of these nutritional elements, particularly the proteid, it is essential to know within reasonable limits the composition of a food, because if the elements are not present in proper proportions, disappointing results may be obtained from their use which will appear inexplicable, but which will readily be accounted for if we know what element of the food is at fault. For these reasons it is coming to be the practice, in infant-feeding especially, to speak of the percentage composition of the milk-foods, as, for example, a food containing 4 percent fat, 7 percent carbohydrates, 2 percent proteids, and .35 percent mineral substances. Knowing from wide experience the percentage of these ingredients generally needed in a food if it is properly to nourish a child, it becomes possible to know in an instant whether an infant is having a food of suitable nutritive value, by comparing its known composition with that established by experiment, as requisite.

The Selection of Food.—In looking over analyses of foods many substances will be noticed which, according to their chemical composition, have the same food-value, but which common sense tells us are not interchangeable. For instance, no one would attempt to feed cracked oats to a human being unless thoroughly cooked, but he would give them raw to the lower animals. They will nourish a man or the animal equally well, but for man they must be prepared, while the horse, for example, can utilize them in their original state. This illustrates the importance of *adapting food* to the consumer. Often the question in feeding is not so much, Is the food nutritious? as, Can the patient assimilate it? Oftentimes success in infant-feeding lies in the physician's ability to discover a form of fat, carbohydrate, and proteid which the infant can assimilate. In the following pages feeding measures for temporary use will be found which may not conform to what some may consider strictly scientific

principles; yet they often give brilliant results. Looking a little below the surface, it will be found that the measures suggested are not unscientific, and that the results are due to applying the fixed principles of nutrition in perhaps novel or unusual ways. It is usually best to follow the most direct route to any place, but when this is badly blocked, it is better to go another way, if there is one, rather than not to arrive at one's destination.

General Properties of Milks.—When most young animals are born their digestive organs are in a more or less embryonic condition, and it is several months before they entirely outgrow this state. During this period the nourishment is supplied by the mother through her mammary glands, first as colostrum and later as milk. When these secretions are analyzed they are found to consist of fat, carbohydrates, proteids, mineral substances, and water, and in this respect they do not differ from other foods. But the elements exist in the secretion in peculiar forms, and the natural inference is that in some way they must be particularly suited to animals whose digestive organs are still undeveloped.

The digestive secretions of the stomachs of all known animals contain pepsin and hydrochloric acid. In the very young these secretions are feeble, but as development proceeds they are much more abundant. To understand milk as a food one must know the effect upon it of pepsin and acid. When pepsin is added to tepid cow's milk it causes the milk to gelatinize, with the formation of curd or junket. If the milk is slightly acidified or soured, the curd formed is dense and solid and more difficult of digestion. When the milk of the cow or the ass or human milk is treated with pepsin and acid in exactly the same way, curds totally different are formed, and as the human digestive organs are different from those of the cow or the ass it is believed that these differences in the digestive properties of milks are for the purposes of making the milks suitable for the different kinds of digestive tracts. Milks may be regarded as special forms of food which require greater digestive effort as the digestive secretions of the stomach become stronger, and thus solid food is furnished to the developing stomach. It is that portion of the proteid of the milk called "casein" that is changed into a solid by the pepsin of the stomach. The term casein, however, has been loosely applied to all the proteids of all milks. The caseins of all milks are not alike in their digestive properties. Therefore the mistake of so considering them should be guarded against. A consideration of such a modification and adaptation of cow's milk as will make it acceptable to the infant's digestive possibilities will be found in the chapters dealing with Substitute Feeding.

HUMAN MILK

While human milk varies as to the proportion of its nutritional elements at different periods of lactation, and even at different times of the day, milks upon which infants thrive agree within certain limits, so that a standard of limitations may be laid down. Among a great many specimens which I have examined the solids have ranged between 12 and 13 percent. The range in fat has been from 2.75 to 4.65 percent, proteid from 0.9 to 1.8 percent, sugar from 5.50 to 7.3 percent. These figures represent the analyses of the breast-milks given children who were thriving and who were of different ages. These variations are not as wide as have been reported by others, but it is to be remembered that these were all babies who were thriving. Whoever has examined breast-milk even a few times is aware of the existence of the widest possible variations. I have seen breast-milks which contained 8 percent of fat and others which contained only 0.5 percent, but children thus fed were not well. Fat exists in mother's milk in minute globules as an emulsion. It varies somewhat in composition, depending upon the kind of food eaten.

The proteids of breast-milk offer a wide field for further study. There are several of these proteids, the most important being casein and lactalbumin. The proportions are subject to considerable variation, depending upon the diet and habits of life of the producer. With a continuation of lactation there is a diminution of the proteid, so that at the ninth or tenth month it is considerably reduced, the total proteid often being not over 1 percent. The sugar content varies less than does either the fat or proteid, its range of limitation, even in milk otherwise poor, being not over 1.5 or 2 percent.

Directions for nursing well children will be found on page 62. As to whether the child is getting a sufficient quantity of milk may be determined by weighing the baby before and after nursing. For this purpose the scales used for weighing children should weigh accurately in one-half ounces. The child need not be undressed. He is weighed when put to the breast and weighed at the completion of the nursing. I have repeatedly found children who should get three ounces or more at a feeding who after the fifteen-minute nursings had increased in weight but one-half or one ounce, showing that only so much milk had been taken. Occasionally cases have been seen where there was no gain whatever after nursing and yet the child was supposed to have been fed. In difficult breast-feeding it is well personally to supervise a nursing or two, by which means much valuable information may be gained.

Examination of Human Milk.—Milk of the mother is usually

examined to determine whether it contains a sufficient amount of fat, sugar, and proteid to nourish the infant; or to determine whether the quantity of one or more of the nutritional factors is excessive or deficient. Microscopic examination shows us little except the presence of colostrum, which usually disappears about the ninth day and is to be considered abnormal if present after the twelfth day. The presence of blood and pus may also be detected by the microscope. For an accurate analysis the milk should be sent to a laboratory properly equipped for such work. For absolute accuracy it is not safe to judge from the analysis of one specimen of milk; at least two, better three, specimens should be analyzed before coming to a conclusion. In collecting milk for examination the middle of a nursing should be selected.

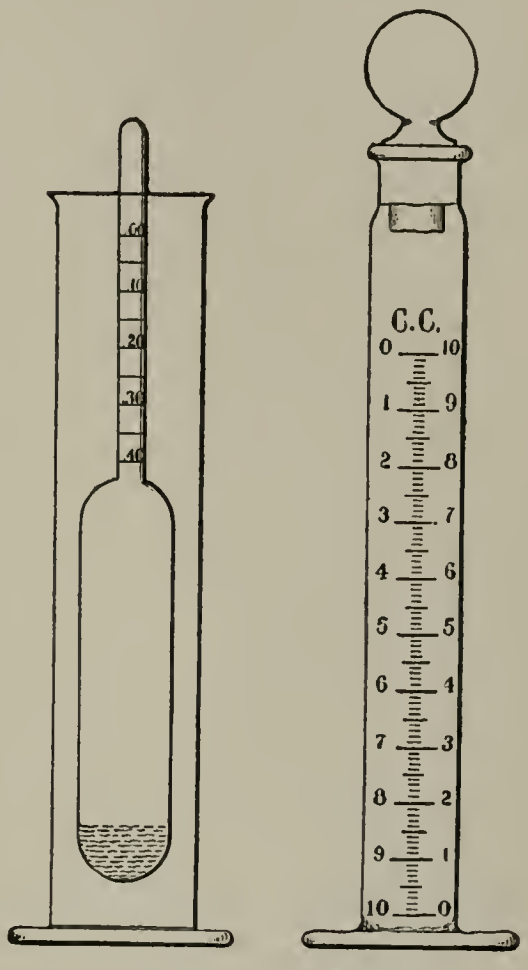


FIG. 7.—THE HOLT MILK SET.

Laboratory analysis is expensive, however, and beyond the possibilities of many. For out-patient work and those cases in which a determination of approximate percentages is sufficient I have found the Holt milk set (Fig. 7) of great service. The set consists of a lactometer and two cream-gages. The method of its use is explained by Holt as follows:

"The simplest method is by the cream-gage. Although its results are only approximate, they are in most cases sufficiently accurate for clinical purposes. The tube is filled to the zero mark with freshly drawn milk, which stands at room-temperature for twenty-four hours, when the percentage of cream is read off. The ratio of this to the fat is approximately five to three; thus 5 percent cream indicates 3 percent fat, etc.

"*Sugar.*—The proportion of sugar is so nearly constant that it may be ignored in clinical examinations.

"*Proteids.*—We have no simple method for determining clinically the amount of proteids. If we regard the sugar and salts as constant, or so nearly so as not to affect the specific gravity, we may

form an approximate idea of the proteids from a knowledge of the specific gravity and the percentage of fat. We may thus determine whether they are greatly in excess or very low, which, after all, is the important thing. The specific gravity will then vary directly with the proportion of proteids, and inversely with the proportion of fat—*i. e.*, high proteids, high specific gravity; high fat, low specific gravity. The application of this principle will be seen by reference to the accompanying table.[1]

"WOMAN'S MILK

	Specific Gravity, 70° F.	Cream—24 Hours.	Proteid (Calculated).
Average.....	1.031	7 percent.	1.5 percent.
Normal variations.....	1.028–1.029	8 percent–12 percent.	Normal (rich milk).
Normal variations.....	1.032	5 percent–6 percent.	Normal (fair milk).
Abnormal variations.....	Low (below 1.028)	High (above 10 percent).	Normal (or slightly below).
Abnormal variations.....	Low (below 1.028)	Low (below 5 percent).	Very low (very poor milk).
Abnormal variations.....	High (above 1.032)	High.	Very high (very rich milk).
Abnormal variations.....	High (above 1.032)	Low.	Normal (or nearly so).

"Any specimen taken for examination should be either the middle portion of the milk—*i. e.*, after nursing two or three minutes—or, better, the entire quantity from one breast, since the composition of the milk will differ very much according to the time when it is drawn. The first milk is slightly richer in proteids and much poorer in fat."

MATERNAL NURSING

Writers on this subject are very apt to state that the ability of the mother, particularly among the well-to-do, to fulfil this most important function is surely decreasing. This may have been a true statement a decade ago; at the present time, however, I am sure it is erroneous. In my own medical life I have seen a change for the better, particularly during the past five years. The young mother of today is better able to nurse her offspring than was her sister five or ten years ago. I attribute this to the fact that the youth of the present day are more vigorous, more nearly normal individuals than were those of a decade ago. The inability to perform the nursing function so that it will be successful has always been attributed to the mother *per se*. This, I think, is an error. Not every breast-milk for two or three weeks after parturition is ideal, as I have found

[1]The Holt apparatus may be obtained from Eimer & Amend, Eighteenth Street and Third Avenue, New York.

by the examinations of hundreds of them. If a child is born with a generally enfeebled vitality, it keenly feels any slight abnormality in the milk, or it may not be able to digest perfectly normal milk; in either event, the milk disagrees and the nursing is discontinued. Breast-milk during the first two or three weeks of the infant's life is produced under conditions which are unfavorable—conditions which do not indicate the possibilities of the breast as a secreting organ. Following, as it does, upon the stress of confinement, it is not indicative of what may be possible later when the customary life and daily habits are resumed. Repeatedly I have found a very high fat or a high proteid, or both, during the first week or two, entirely corrected later without interference. This condition at the time was considered sufficiently serious to warrant the discontinuance of nursing on the part of a weakly infant, while in a vigorous infant it would be entirely ignored.

The change which enables more mothers successfully to nurse their infants is due to two causes—more vigorous fathers and mothers and more vigorous offspring. Following this line of reasoning, the more normal the mother, the better able is she to perform this normal function. That this is the case is due, I believe, to the fact that growing girls and young women are leading more hygienic lives than formerly. The making of golf, bicycle and horseback riding, boating, and automobiling popular and fashionable—in short, the taking of girls out of doors and keeping them there a considerable portion of the day—has worked a marvelous change for the better, both physically and mentally. A neurotic mother makes the poorest possible milk-producer. Proportionate to the population, there are fewer neurasthenics among the young women today than there were ten years ago, and there will be still fewer ten years hence. At the present time the timid, retiring young woman of the neurasthenic type is not popular in her set. It is a fortunate thing for the future of the human race, at least for that portion of it which resides in the United States, that the young woman has transferred her allegiance from the crochet and embroidery needle to the golf club. It may be said that our argument holds only with the wealthy or the well-to-do. Imitation is one of the strongest characteristics of the human race, and this tendency in America to outdoor hygienic living pervades all classes. Saturday half-holidays, the excursions and outings afforded by reduced rates in transportation, are much more popular than they were ten years ago. Food is better selected and better prepared, owing to increased knowledge on the part of the people as to what constitutes proper nutrition. These are facts, in spite of the sensational novelists and magazine-writers.

A feature which marks an important advance in the right direction is the establishment of a department in dietetics and food economics in the New York Training School for Teachers. The Dean, Dr. James

E. Russell, in establishing this course is producing benefits which perhaps are more far-reaching than he realizes. The students are taught food values, food preparation, and food economics, which consists in providing for a given amount of money the most nutritious food in its most attractive form. Hundreds of teachers are sent out from this institution every year to take their places of usefulness as instructors of the young in all portions of the country. Each has learned something of food values, and, better still, each has had impressed upon him or her the importance of the proper nutrition of a growing child. They are taught that, without this, the best possible type of adult cannot be produced. As a result of such instruction they will be of far greater service in their fields of labor; for not only can they teach what is laid down in the books, but, what is equally if not more important, they are competent to teach those under their care how to live; and those who live properly, grow properly, following out the maxim of Herbert Spencer that "the first requisite for success in life, is to be a good animal; and to be a nation of good animals, is the first condition of national prosperity." It may be thought that we have wandered far from our subject—maternal nursing, but such is not the case; for conditions which relate to this important function, even remotely, demand our respectful consideration. The food and care of the growing girl have the most intimate bearing upon her future life, and if she is to be called upon to perform the most important function of womanhood, she surely has the right to demand that she receive during her girlhood proper preparation, which heretofore has too often been denied her.

It is not pleasant to criticize physicians; but friendly criticism should always be welcomed. The family physician does not, in a great majority of instances, fulfil his function, or extend his field of usefulness to its full capacity, his conception of duty too often including only the sick. Unsought advice as to the feeding and daily habits of a child's life, I find are usually welcomed and appreciated by the parents. In practically every instance, according to my observation, errors in a child's management are due to ignorance. Parents, no matter what their station in life, are glad to do what is for the best interests of their children when it is made clear to them. It is our duty to take parents into our confidence and explain to them the reasons for the line of action advised. When they appreciate the reason for certain procedures, I find that they are far more apt to follow them. I am confident from observations upon many cases that if I could have the physical direction of ten average girls in any station in life, provided that they could have the benefit of fresh air and good food from infancy to adolescence, successful nursing mothers could be made out of eight of them. Certain rules of life having a direct bearing on nursing lead us nearer the ideal and may enable one who otherwise could not nurse her child to do so

successfully. These requirements, it will be seen, are laid along common-sense lines and cause no hardship or mental distress—one of the chief requirements of a nursing woman being that she shall be mentally normal.

There are few conditions in which we are called to act so variable and so uncertain as is the production of breast-milk. Breast-milk is one of the most precious substances. It is invaluable unless we can put a value on human life. The most successful nursing age is between the twentieth and thirty-fifth years. I have, however, seen it successfully carried on in a girl of fourteen, in a woman of fifty-two, and in the much abused society girl, while I have seen it fail absolutely in peasant women fresh from the fields of Hungary and Bohemia. I have seen those in whom at first the nursing was most unsatisfactory, develop into perfect nurses.

Some mothers will be able to carry on the nursing for only two months; others, three, five, seven, or nine months. In my experience whether in out-patient or in private practice, it is extremely rare for the breast-milk to be sufficient for a child after the ninth month.

The following can be laid down as nursing axioms:

A diet similar to what the mother was accustomed to before the advent of motherhood should be taken.

There should be one bowel evacuation daily.

There should be from three to four hours daily spent in the open air with exercise which does not fatigue.

There should be at least eight hours' sleep out of every twenty-four.

There should be absolute regularity in nursing.

There should be no worry and no excitement.

The mother should be temperate in all things.

The Diet.—I have many times been consulted by nursing mothers because the nursing was unsuccessful or a partial failure, and have found that their diet had been restricted to an extreme degree. To put on a greatly restricted diet a robust young mother who has always eaten bountifully of a generous variety of foods is one of the best means of curtailing the quantity and lowering the quality of her milk-supply. When asked to prescribe a diet I tell them to eat practically as they were accustomed to before the advent of pregnancy and motherhood. That this particular vegetable or that particular fruit should be forbidden on general principles is a fallacy. Food that the patient can digest without inconvenience is a safe food so far as the nursing is concerned, as may readily be determined in any given case. If a wide range of diet is prescribed in some individuals, a plain, more or less restricted diet is desirable in others. This must be remembered in the management of the wet-nurse (page 81). Many a wet-nurse who has been carefully selected,

who to the best of our judgment should prove satisfactory, utterly fails in a few days to fulfil the duties of the office for which she was chosen. In not a few instances the failure is due to a very full diet of unusual articles of food, the existence of which, in many instances, she never dreamed of. Indigestion and constipation follow, and both the nurse and the baby are made ill and the woman's usefulness ceases. A woman who has lived and kept well on the diet and food found in the home of the laboring-man, whether in the city or country, will make a far better wet-nurse on this diet than if she indulges in food to which she is entirely unaccustomed. The diet of a nursing mother, then, should in general be that to which she has been accustomed.

Nursing is a perfectly normal function, and a woman should be permitted to carry it out along only natural lines. Inasmuch as there are two lives to be provided for instead of one, more food, particularly of a liquid character, may be taken than she may have been accustumed to. It is my custom to advise that milk be given freely. A glass of milk may be taken in the middle of the afternoon and eight ounces of milk with eight ounces of oatmeal or cornmeal gruel at bedtime, if it does not disagree with the patient. Our only evidence that a food is not disagreeing is the condition of the digestion. When any article of food disagrees with the mother, or if she is convinced that it disagrees, whether or not such is really the case, the food should be discontinued. In a general way, milk in quantities not over one quart daily, eggs, meat, fish, poultry, cereals, green vegetables, and stewed fruit constitute a basis for selection. The method of preparation for the different meals is not arbitrary.

The Bowel Function.—A very important and often neglected matter in relation to nursing is the condition of the bowels. There must be one free evacuation daily. For the treatment of constipation in nursing women I have used different methods in many cases. The dietetic treatment does not promise much. For here, again, manipulation of the diet may interfere with the milk production. Three methods are open to use—massage, local measures, and drugs. Massage is available in comparatively few cases. Local measures consist in the use of enemas or suppositories. Every nursing woman under my care is instructed to use an enema at bedtime if no evacuation of the bowels has taken place during the previous twenty-four hours. Many out-patients, in whom constipation is very prevalent, indulge in excessive tea-drinking, taking often from one to two gallons of tea daily. In such patients where an absolute discontinuance of the tea-drinking is often impossible and not absolutely necessary, I usually allow two cups a day. For a laxative in such cases and in many others, a capsule of the following composition has served me well:

℞. Extracti belladonnæ ..... gr. ¼
Extracti nucis vomicæ ..... gr. ½
Extracti cascaræ sagradæ ..... gr. v
M. et ft. capsula No. j.
Sig.—To be taken at bedtime.

The amount of the cascara sagrada may be varied as the case may require. In not a few instances I have found it necessary to give two capsules a day in order to produce the desired result. Neither the belladonna, the nux vomica, nor the cascara appears to have any appreciable effect on the child.

Air and Exercise.—Outdoor life and exercise are desirable here as they are under all other conditions. In a nursing woman with her added responsibility, they are doubly so. In order to get the best results, exercise or work should so be adjusted as not to reach the point of fatigue. The mother whose nights are disturbed should be given the benefit of a midday rest of an hour or two. She should have at least eight hours' sleep out of every twenty-four. Certain annoyances, anxieties, and worries are inseparable from the life of every child-bearing woman. It should be our duty, however, to explain to the mother and to other members of the family that an important element in satisfactory nursing is a tranquil mind. During the lactation period she should be spared all unnecessary care and petty annoyances.

Regularity in Nursing.—The breast which is emptied at definite intervals invariably works better than does one which is not, not only as regards the quantity, but the quality of the milk as well; so that system in breast-feeding is almost as essential to milk-production as to its digestion and assimilation.

After it is demonstrated that the nursing is progressing satisfactorily as proved by the satisfied, thriving child, I begin with one bottle-feeding daily. The advisability is obvious; in case of illness of the mother, if she is called away from home, or if, for any reason, the child cannot have the breast, the feeding is provided for. Another advantage is that it gives the mother needed freedom from restraint. She is thus enabled to have the benefit of a change of scene. Amusements and recreations which the invariable nursing period denies her can be indulged in. As a result of this greater freedom, she is able to supply better milk and to continue nursing longer than if tied continually to the baby, no matter how fond she may be of it.

Frequency of Nursings.—The new-born infant is entitled to ten nursings in twenty-four hours. From 6 A. M. to 10 P. M., inclusive, there should be nine nursings. There may be one nursing at 2 or 3 A. M. As the child becomes older less frequent nursings are required. The following table will be found useful in this connection:

3d	to the 21st day	10	nursings.
3d	" " 6th week	9	"
6th	" " 12th week	8	"
3d	" " 5th month	7	"
5th	" " 7th month	6–7	"
7th	" " 12th month	5–6	"

Giving of Water.—From one-half to one ounce of a 1 percent solution of milk-sugar should be given the infant every two hours until the milk appears in the breast. Otherwise there will be unnecessary loss in weight and perhaps a high degree of fever due to inanition.

If the child is restless and uncomfortable, it is safe to conclude that he is thirsty, and one ounce of the sugar-water will usually satisfy him. With the commencement of nursing, accustom the baby to getting his food at regular intervals.

Signs of Successful Nursing.—The child shows a gain of not less than four ounces weekly. This is the minimum weekly gain which may safely be allowed. When a nursing baby remains stationary in weight or makes a gain of but two or three ounces a week, it means that something is wrong, and it will usually, but not invariably, be found in the milk-supply. When the baby is nursed at proper intervals and the supply of milk is ample and of good quality, he is satisfied at the completion of the nursing. If he is under three months of age, he falls asleep after ten or twenty minutes at the breast. When the nursing period again approaches, he becomes restless and unhappy, crying lustily if the nursing is delayed. When the breast is offered, he takes it greedily. The stools are yellow and number from two to three daily. The weekly gain in weight under such conditions is usually from six to eight ounces.

Signs of Unsuccessful Nursing.—Theoretically, every normal breast baby should be a thriving, well baby. That such is not the case, is an unfortunate fact. The standard established for a well baby is not upheld here. When the supply of milk is scanty the child remains long at the breast and cries when he is removed. He shows signs of hunger before the nursing hour arrives. A cause of failure in breast-feeding, and probably the most frequent cause, is a scanty milk-supply. The chief nutritional elements in mother's milk are fat, 3 to 4 percent; sugar, 7 percent; proteid, 1.5 percent. Failure may be due to a marked disproportion of these elements which may cause sufficient indigestion and resulting loss in weight to necessitate a discontinuance of nursing. Thus there may be a high fat—from 5 to 6 percent; or very low fat—from 1 to 1.5 percent. In the high-fat cases there will usually be diarrhea with green, watery stools. The child strains a great deal and there are green stains on many of the napkins. In high-fat cases there is also regurgitation or vomiting of sour material. The fat-globules may readily be made out if the vomited material is placed under a low-power

microscope. Low fat means deficient nourishment and may cause constipation. Sugar is rarely a cause of trouble in nursing babies. It seldom varies, ranging from 5 to 7 percent in the great majority of breast-milks. Young children, further, have a marked toleration for it. The proteid of mother's milk is the most frequent cause of nursing difficulties. Like the fat, it may so be decreased that nutritional disorder may be induced in the patient, or it may be very much increased, the latter being usually the cause of colic or constipation in otherwise healthy nursing infants. In such infants curds may be found in the stools, the passage of which is always accompanied by a great deal of gas. The milk may contain the normal percentage of fat, sugar, and proteid, but be scanty in amount. Instead of the four or five ounces to which the child is entitled, he may get but one or two ounces. Whether or not the quantity is sufficient, can be determined by weighing the baby before and after each nursing for twenty-four hours. One ounce of breast-milk weighs practically one ounce avoirdupois. The quality or strength is determined by an examination of the milk itself (page 64). Before nursing, the child is put in the scales without undressing him and the weight noted. He is allowed to nurse fifteen minutes. He is then removed from the breast and weighed. A child under one week old should gain from 1 to 1½ ounces; at three weeks of age, 1½ to 2 ounces; four to eight weeks of age, 2 to 3 ounces; eight to sixteen weeks of age, 3 to 4 ounces; sixteen to twenty-four weeks of age, 4 to 6 ounces; six to nine months of age, 6 to 8 ounces; nine to twelve months of age, 8 to 9 ounces. Of course, arbitrary limits cannot be fixed as to the quantity.

Stationary weight or loss in weight with a dissatisfied child usually means defects in quantity which are readily proved by the weighing. To be fed at the breast may also cause the child to suffer from an excess of good milk, in which event there will be vomiting or regurgitation, usually associated with colic. When this overfeeding continues, dilatation of the stomach develops, vomiting becomes habitual, the child loses in weight, and the breast-milk is said not to agree, and often, unfortunately, the baby is weaned. This has been the outcome in scores of cases. When there is habitual vomiting and colic in a nursing baby, two things are to be done—the baby must be weighed before and after nursing, and the milk must be examined.

I have repeatedly treated children for indigestion who were entirely relieved by shortening the nursing period. Weighing the baby at intervals of from three to five minutes and noting the gain has shown that the three or four ounces which may be the child's stomach capacity were obtained in two, three, or five minutes, the excess which the child took over this amount being the cause of his trouble. Given a free, full breast and a vigorous nurser, and one

ounce will be taken in one minute. When the nursing "gait" is established, a child should be kept up to the schedule. There are few more pernicious teachings than that a baby should be allowed to nurse when he wants to and as long as he wants to. The idea that a nursing infant will take no more than is good for him is the fruit of inexperience. Recently a mother consulted me in regard to putting her one-month-old baby on the bottle, as he had many green stools, cried a great part of his waking hours, and weighed but a few ounces more than at birth. Her milk was supposed to be "too strong" for the child. An examination of the breast and a talk with the mother satisfied me that the breast-milk was not at fault. An examination of the milk proved it to be good average milk—3.5 percent fat, 6 percent sugar, 1.45 percent proteid. A one day's test by weighing was decided upon. He was allowed to nurse one minute and rest one minute. During the resting period he was weighed. Weighing and resting him in this way, it was found that in three minutes he got from 3 to $3\frac{1}{2}$ ounces of milk. The nursing was then reduced to three minutes on one breast and five minutes on the other, which was the "slower" breast of the two. Every sign of indigestion promptly disappeared after this change. The stools became normal and the infant made a satisfactory gain in weight of one ounce daily.

The quantity may be suitable for the age of the child, he may not vomit or show a sign of indigestion, and yet he may not thrive. In such a case an examination or repeated examinations of the milk at intervals of two or three days will usually show that it is poor, below the normal perhaps in both fat and proteid. Such a case occurred in the New York Infant Asylum. A Swedish woman was admitted with an infant two months old in fair condition. She had an abundance of milk and asked for a foster-child, so great was her discomfort from the excessive flow of milk. The weekly weighings of the children soon revealed that there was no growth, and after a few weeks both children upon examination showed developing rickets. The milk was then examined and was found deficient—fat 1.2 percent, sugar 5 percent, and proteid 0.73 percent.

Signs of Insufficient Nursing.—The baby remains long at the breast, perhaps one-half to three-quarters of an hour. When removed, he is restless and uncomfortable. After a short time, in an hour or less, he is very hungry and demands frequent nursings day and night.

Management of Abnormal Milk Conditions.—When it is found that the breast-milk is too strong or too weak, or when the normal ratios of fat, sugar, and proteid are not maintained, it may be possible to increase or diminish the milk strength. It may also be possible to increase either the fat or the proteid when desirable. The heavy milk will usually be found in mothers who are robust.

who eat heartily, and who take but little exercise. In such a mother, the prescribing of a plain diet, allowing red meat but once a day, discontinuing the malt liquors or wine,—which it will often be found that she is taking,—and directing that she walk a mile or two a day, will frequently bring the milk to digestible proportions. In some cases, however, this will not be successful, and the colic, constipation, and vomiting continue, even though the quantity obtained at each nursing is within normal limits. In some mothers it will be impossible to change the mode of life, except perhaps as to the discontinuance of alcohol. When such conditions prevail, the mother's milk may be modified by giving from one-half to one ounce of boiled water or plain barley-water before each nursing. This is a procedure to which I frequently resort. One teaspoonful of lime-water added to one ounce of water before each nursing has made the breast-milk agree when otherwise it would have been impossible. When the milk is deficient both in fat and proteid, a diet composed largely of red meat, poultry, fish, rye bread, or whole-wheat bread, oatmeal, cornmeal, with two or three pints of milk daily, will often be followed by an increase both in fat and proteid. The use of alcohol in moderate amounts, in the form of malt liquors or wine, will usually increase the fat. I have frequently seen it advance 2 percent in from two to three days. Disappointments in improving the quantity or quality of the breast-milk, however, are frequent.

In addition to the one bottle which, for reasons above mentioned, is given early in the child's life, I find it necessary at the seventh month to add an extra bottle or two. Usually at this time the proteid in human milk begins to diminish in quantity, and as this is the most important nutritional element, an insufficient quantity at this rapidly growing period of life is a matter of no little importance. At the twelfth month, with very few exceptions, my nursing babies are weaned from necessity. At this age exclusive breast-nursing, if one consider the best interests of the child, is practically out of the question. Out of many thousands of mothers I recall but one instance where a mother was able successfully to nurse her child after the twelfth month. This remarkable woman, a mother of six children, had nursed every one of them exclusively up to the fifteenth or the eighteenth month.

Mixed Feeding.—With a diminution in the amount of milk secreted, the breast-milk must, of course, be supplemented by modified cow's milk. This method of feeding is usually successful. If the mother of a six-months-old baby can satisfactorily nurse him three times in twenty-four hours, he is given, in addition, three bottle-feedings, in this way supplementing the mother's milk. It is best when using mixed feedings to alternate the breast and the bottle. The modified milk strength should be that which is suitable for the average child of his age. (See Infant-Feeding, page 83.) In beginning the use of cow's milk, however, it must be remembered

that at first a weaker strength must be used than the child will require for growth, this weaker food being necessary in order gradually to accustom him to the change. If too strong a cow's-milk mixture is given at first, it will be very apt to disagree, causing colic and vomiting. Later, when the child has become accustomed to the new food, a stronger mixture may be given. When a mother cannot give her infant at least two satisfactory breast-feedings daily, it is better to wean the child.

Maternal Conditions under Which Nursing is Forbidden.—When the mother has tuberculosis in any of its various forms or manifestations, whether it involves the glands, the joints, or the lungs, breast-feeding is to be forbidden. In epilepsy and syphilis nursing is likewise forbidden. In nephritis and malignant disease of any nature, and in chorea, nursing should be discontinued. Women who are rapidly losing weight should not be allowed to continue nursing their infants. In case of serious illness of any nature, such as typhoid fever, pneumonia, or diphtheria, and upon the advent of pregnancy, nursing should be stopped.

Care of the Breasts during Weaning.—When the breast-feeding is carried on the usual length of time,—from nine to twelve months,—the process of weaning ordinarily causes little or no discomfort. All that is usually required is to press out enough of the milk to relieve the patient as often as the breast becomes painful, which may not be more than two or three times a day. When the weaning is necessarily abrupt, no little discomfort may result. If there is a free flow of milk, which is apt to be the case when the weaning must take place in the early nursing period, tightly bandaging the breasts is required. When localized hardened areas occur in the glands, they should be massaged until softened, and the bandage reapplied and worn until the secretion ceases. When the weaning can more gradually be done, the best way is to give one less nursing every second or third day until only two are given. After this has been practised for one week, these also can be discontinued. In cases where sudden weaning is required, a saline laxative, such as citrate of magnesia or Rochelle salts, should be given every day for five days—sufficient to produce two or three watery evacuations daily. In the mean time the mother should abstain from fluids of all kinds up to the point of positive discomfort.

Conditions Which may Temporarily Produce an Unfavorable Effect upon the Breast-milk, but not Necessitate the Discontinuance of Nursing.—The advent of the first menstruation period particularly, and in some cases of every menstruation period, is attended with an attack of colic or indigestion on the part of the child, rarely sufficient, however, to necessitate the discontinuance of the nursing even for a single day.

Factors influencing the mental conditions of the mother, such as anger, fright, worry, shock, distress, sorrow, or the witnessing of

an accident, may affect the milk secretion sufficiently to cause no little discomfort to the child, and oftentimes the temporary lessening of the flow for a day or two. The influence of the mental state upon the character of the milk was early brought to my attention while resident physician at the County Branch of the New York Infant Asylum. In this institution there were usually about two hundred nursing mothers, the majority of them from the lower walks of life, at least 95 percent of the infants being illegitimate. The necessity of placing a considerable number of these mothers in wards, and their living thus in close contact, gave rise to rather frequent disputes, and not infrequently to fistic encounters of a decidedly vigorous character. After a particularly active disturbance, several nursing infants in the ward would be taken suddenly ill, usually with vomiting, diarrhea, and fever. When two or more infants were thus discovered ill, we soon learned to know the cause when inquiry or evidence furnished by hasty inspection of the mother showed that she had been particularly active in the affair. A small proportion of the mothers were from the better walks of life. Letters of forgiveness or reproach or visits of a like nature from fathers, mothers, or sisters, have brought many a sick baby to my attention and caused me many anxious moments.

FIG. 8.—NIPPLE-SHIELD.

Conditions Which call for Temporary Discontinuance of Nursing.—During an acute illness with fever, such as indigestion, tonsillitis, and minor illnesses of a like nature, nursing should be discontinued for a day or two. When the infant is removed from the breast, it should be our effort to maintain the flow of the milk. This is best done by emptying the breast with a breast-pump (page 79) at the usual nursing period until the time arrives when the nursing may be resumed. In such conditions the advantage of having the baby accustomed to one bottle a day will at once be appreciated.

Care of the Nipples.—Six hours after delivery or confinement the nipples should be washed with a saturated solution of boric acid and the child put to the breast and nursing attempted. After this, the attempts at nursing should be repeated every four hours, although the milk does not appear in the breasts until from forty-eight to seventy-two hours after the birth of the child. Colostrum may be

present, which is useful as a laxative and may satisfy the child. A further advantage of the nursing at this time is that it gradually accustoms both the nipple and the infant to what will be required of them later. Immediately after the nursing, the nipple should be carefully washed with a saturated solution of boric acid and thoroughly but gently dried. A baby should never be allowed to nurse on a cracked or fissured nipple. For this very painful condition a nipple-shield (Fig. 8) should always be used.

CRACKED AND FISSURED NIPPLES

Fissures of the nipples are often the result of lack of care and cleanliness. Nipples that are not washed and dried, but allowed to remain moist after nursing, particularly during the first few days, are also very apt to become macerated and cracked. In the cases in which there is a tendency for the breasts to "leak," the milk decomposes on the nipples, and in addition to the maceration, the nipple is excoriated by the acids formed by the decomposition in the milk. Leaking nipples should be kept covered with pads of sterile absorbent gauze. Cracks and fissures in the nipple may be sufficiently painful to prevent a continuance of the nursing. In getting the histories of not a few bottle babies, I have been told that nursing had been stopped because of cracked nipples. The prevention and successful treatment of the condition, therefore, is a matter of no little importance. A strong child tugging on a fissured nipple may be an excruciatingly painful process for the mother, and when the fissures are not healed, it can readily be understood that the pain accompanying and the dread of nursing may produce sufficient mental distress to change the character or stop the flow of the milk, either of which may require that the nursing be discontinued.

Treatment.—The treatment which gives the best results, and which is used exclusively at the New York Infant Asylum and Maternity, is to bathe the parts with a saturated solution of boric acid after each nursing, dry the nipple, and apply a pad of sterile gauze. Once or twice a day, the cracks or fissures are painted with an 8 percent solution of nitrate of silver. There is no pain attending this application. The pad of sterile gauze just referred to is placed over the nipple and held in position by a binder sufficiently tight to support the breasts. Before the next nursing the nipple is bathed with sterile water and the infant takes the breast as usual. If there are deep fissures, it may be well for a day or two to use a nipple-shield (page 77). Another important reason for a rapid healing is the danger of infecting the gland through the open nipple wound—the usual cause of mammary abscess. The use of an ointment to the nipples is not advised, for the reason that it is of little or no service; in fact, in most cases ointments do harm because they soften the epithelium and make the nipple tender.

CAKING OF THE BREASTS

Caking of the breasts is very apt to occur during the first few days of nursing. The milk, when it appears in the breasts, is often secreted in large amount. A great deal more is supplied than the child, with its small stomach and usually indifferent nursing, is able to digest. The breasts should be watched very carefully during this time so as to guard against the possibility of the milk remaining undrawn, with the resulting harm. After the completion of the regular nursing, if a considerable amount of milk remains in the breasts, it should be drawn by the breast-pump (Fig. 9) and the breast thus relieved.

Treatment.—When nodules form, they may readily be softened by gentle massage. Lanolin should be used on the fingers so as to avoid unnecessary irritation of the skin. The massage should be repeated as often as the nodules appear. The caking is more apt to occur in the dependent portion of the glands. The so-called pendulous breasts, which may show a tendency to cake, should be supported by a binder lightly applied.

DEPRESSED NIPPLES

Not an infrequent source of difficulty in the management of the nursing function in a primipara is depressed nipples. The child

Fig. 9.—English Breast-pump.

cannot get a sufficient hold to make suction possible. He thus fails to get the desired nutriment, and both the child and the mother become exhausted in consequence. When this is repeated a few times, the child is very apt to refuse to make any attempt at nursing. In such cases the use of the nipple-shield (Fig. 8) is often indispensable, until the nipple is sufficiently drawn out and developed for the child to get hold of. Preceding each nursing it is well to manipulate the nipple for a few minutes or to elongate it by the use of the breast-pump (Fig. 9), but not using sufficient force to draw the milk.

ACUTE AND SUPPURATIVE MASTITIS IN THE MOTHER

When inflammation of the breast develops with fever, chills, and prostration, it is usually the result of an infection through the nipple, generally one with visible cracks and fissures. For our purposes the different varieties of mastitis need not be considered. Nursing of the involved breast should be discontinued, for the sake of both the child and the mother; in fact, the pain is often so great that nursing is impossible. A supporting bandage should be applied and the milk drawn with the breast-pump at the usual nursing times. It must be our aim to induce resolution without the formation of pus. This is best accomplished by the use of an ice-bag which is kept constantly applied to the inflamed, indurated area. If there is a tendency to constipation, saline laxatives should be used. In fact, the patient will often be benefited not a little by two or three watery evacuations daily. With a subsidence of the temperature and an abatement of the inflammation, nursing may be resumed. As soon as the presence of pus is determined, it should be removed regardless of its location in the gland. I have seen cases of intestinal infection in the infant and of infectious processes in other parts of the body that were undoubtedly due to its being allowed to nurse on suppurating breasts.

THE WET-NURSE

We are called upon to select a wet-nurse under various conditions. In a few families, particularly in those who have had disastrous feeding experiences, we are asked that no attempts at artificial feeding be made, but that a wet-nurse be engaged in advance of the confinement so as to be ready when the time for her service arrives. Usually, however, our minds and those of the parents turn to the wet-nurse when nutrition by other methods is a failure. It is well to remember in this connection that it is not wise to postpone our resort to the wet-nurse too long—until every chance for her being of assistance has passed. It may take a few days' observation or but a single glance at one of these difficult feeding cases for us to decide whether a wet-nurse must be secured. Certain it is that in a few cases we cannot do without them. I see perhaps two or three cases a year, usually in consultation, in which I insist that further attempts at artificial feeding be discontinued because of the reduced condition of the patient.

In the selection of a wet-nurse the age during which nursing is most successfully carried on is to be remembered. Other things being equal, a wet-nurse should not be under twenty-two or over thirty-five years of age. The peasant women of the continent of Europe make the best wet-nurses. A woman should not be selected as a wet-nurse without a thorough examination both of herself and of her infant. She must be free from skin diseases, tuberculosis,

and syphilis. Whether she is stout or thin, tall or short, amounts to little. Neither can we place much reliance on the size of her breasts. Although full, firm breasts and prominent nipples are desirable, the best indication as to her nursing ability is the condition of her baby. For this reason it is best not to select a woman before her baby is four weeks old, for by that time his physical condition will indicate with considerable accuracy the kind of food he has been getting. The age of the wet-nurse's milk need not correspond with the age of the patient for whom she is engaged. As far as age is concerned, a breast-milk from four weeks to three months old will answer for any infant.

The results attending the first few days of wet-nursing are often most disappointing. The radical change which takes place in the nurse's habits of life, the leaving of her own child to the care of others sometimes produces nervous conditions which may have a decidedly unfavorable influence upon her milk. So before arriving at the conclusion that she will not answer in a given case, she should have time to adjust herself to the changed conditions. Many a good wet-nurse has been ruined, so far as her usefulness as a milk-producer is concerned, by over-indulgence at the table. She has been accustomed to a very plain diet and some work, which necessarily means exercise. Upon assuming her new office she is temporarily the most important member of the household, next to the baby, and articles of food are supplied to which she is entirely unaccustomed and of which she eats plentifully. The result is an attack of indigestion with fever, the baby is made ill, and the usefulness of the wet-nurse in the family ceases. These women usually do best upon a plain diet of meat, poultry, fish, vegetables, cereals, and milk. If they are accustomed to taking beer, one bottle daily may be permitted. Coffee may be allowed to the extent of one cup daily, and of tea not more than two cups should be allowed. Women of this class are almost invariably neglectful of the bowel function, so that this must be attended to. One free evacuation should take place daily. As a rule, the wet-nurse has been accustomed to work and will be more contented and happy when her time is occupied. Being out of doors from three to four hours a day is of decided advantage to every nursing woman. If she possess sufficient intelligence to take the baby for his outings, she should be allowed to do so. For the comfort of the family it is wise not to let a wet-nurse know her full value. When she feels that she is indispensable, trouble is apt to follow from one source or another. It is particularly necessary, therefore, that babies that are wet-nursed should be given one bottle-feeding daily as soon as they are able to take care of it. The wet-nurse will then realize that she can be dispensed with in case of misconduct, or if she leave with an hour's notice the child can be given the bottle until another nurse is secured. In the great majority

of my cases it has not been necessary to continue the wet-nursing after the children are seven months of age, for by this time they can usually be fed on the bottle. Of course, unless her nursing proves unsatisfactory, a wet-nurse should not be dismissed at the commencement of or during the summer.

SUBSTITUTE BREAST-FEEDING; ARTIFICIAL FEEDING

A considerable number of the young of the human race are deprived of their natural means of nutrition, the milk of the mother. For comparatively few is a wet-nurse available. While in proportion to the children born more mothers are nursing their infants now than formerly, nevertheless every year thousands of infants are brought into the world who have to be nourished by other means than human milk. The fact that an immense number of deaths occur every year among these infants because of defective nutrition speaks for itself.

Nutritional Errors.—Mortality statistics give a very inadequate idea as to the part played by nutritional errors in the young, for the reason that in many instances such errors are not the direct or perhaps the immediate cause of death, and for this reason their influence does not appear in mortality statistics. As elsewhere pointed out, and dwelt upon at length in this work, in disease of any nature a child's resistance is a factor of paramount importance. With defective nutrition, resistance is invariably below the normal. Many of the infants who die from the intestinal diseases of summer, from grippe, from tuberculosis, or from infectious diseases, suffer from defective nutrition in different degrees of severity before the immediate cause of death appears.

The Needs of the Patient Paramount.—As the nutrition deals directly with questions of life and death, it is not surprising that volumes have been written on the subject, but it is surprising that the fundamental principles of infants' nutrition are so little understood. This is due in part to the fact that writers and teachers of infant-feeding, in their efforts to be scientific or ultra-scientific, have lost sight of the point that there is a patient as well as a pupil to be considered, and that not a few teachers with their algebraic or otherwise intricate formulas do little but obstruct the progress of rational feeding by making a readily comprehended subject impossible to many. Another common error is in not distinguishing between children—the rich and the poor, the sick and the well. A child with malnutrition, with marasmus, or with a temporarily disordered digestion is by no means a well baby, and when he is given food suitable only for the well, his condition very naturally is not improved.

Environment.—In feeding an infant, several predominant factors must be considered: First, the influences of environment. The infant in a children's institution has to be fed differently from one who comes to a dispensary for treatment, and both must be fed differently in

summer than in winter. The child of well-to-do, intelligent parents is fed still differently. There are no hard and fast lines in infant-feeding other than that there must be an ample supply of such nourishment as the child can digest and thrive upon. Cow's milk is used as the basis of infants' food, for the reason that it is ordinarily readily adapted to the child's digestion and is the most available human milk substitute.

Successful Substitute Feeding.—Successful substitute feeding of infants consists, then, in giving something upon which the child can live and thrive, and when, in addition, this "something" supplies the nutrition which Nature demands, it constitutes scientific infant-feeding, whatever the source of the nutriment. Cow's milk is just as fully an unnatural food for an infant as is barley or rice gruel or the milk of the goat or the ass, and cow's milk only is used, as already mentioned, because in a great majority of cases it answers the given purpose better than does any other food, in that it furnishes in available form the nearest approach to the nutritional elements required. From an analysis of many human milks we know what should constitute a child's food. Cow's milk, however, differs from human milk in important features.

COW'S MILK

As cow's milk furnishes the most available basis of nutrition for the infant who is to be deprived of the mother's milk, it is necessary, in order to secure the best results in its use as an infant food, that it contain total solids between 12 and 13 percent, and that the solids be represented in the nutritional elements in somewhat the following proportions:

Fat	3.5	to 4	percent
Sugar	4	to 4.5	"
Total proteid	3	to 4	"
Ash	0.7	to 0.9	"
Specific gravity	1.028	to 1.033	

In order that there may be a fairly constant strength of the milk, herd-milk is to be preferred to the product of one or two cows, as the quality of the latter may vary considerably from day to day. It has been demonstrated that the best cows for this purpose are what is known as "grade cows," that is, not pure bred. Such cows thrive better, are more easily kept healthy, and are more uniform in the nutritional equivalent of their milk-supply than are high-class registered herds of the Alderney or Jersey strain.

The fat of cow's milk is in the form of a fine emulsion and separates as cream. Its character is affected by the cow's food, being softened when some articles are fed and hardened when other kinds of food are used.

There are several proteids of cow's milk, of which the most important and best known are casein, which forms the curd, and lactalbumin, the proportion being about three parts casein to one part of lactalbumin. In mixed milk from several cows this proportion is by no means constant. The sugar of cow's milk is lactose, which is less sweet to the taste than cane-sugar or granulated sugar or maltose derived from starch. That cow's milk shall contain a certain quantity of total solids, and that it shall be of a specific gravity within certain limits, is necessary in order that it may supply nourishment to the child. Another most important feature to be taken into consideration is cleanliness, which naturally brings us to a consideration of the bacteriology of milk—a large subject which can be but briefly referred to here. Milk fresh from the udder contains very few bacteria, particularly if the first two or three jets from each teat are discarded. The time for bacterial contamination is during the milking and while the milk remains in the stable. Certain forms of bacteria are harmless, and it is impossible to have a milk absolutely free from bacteria. What we need to know is how dangerous bacteria get into the milk, and how they cause changes that may convert it into a poison of greater or less virulence.

Harmless Bacteria.—The souring of milk is the result of the presence of bacteria which produce changes in the sugar of milk with the formation of lactic acid. The "turning" of milk during a thunder-shower is due to certain changes in the atmosphere that aid in the development of the bacteria which convert lactose into lactic acid.

Harmful Bacteria.—Bacteria of decomposition under conditions favorable to their growth attack the proteid constituents of the milk, producing putrefactive changes with evolution of poisons which may be of the greatest virulence. The putrefactive bacteria are always present in stables where manure is allowed to collect, and where cleanliness is not observed. When we remember what a culture-field milk affords to bacteria, and when we see the manner and the surroundings in which it is usually drawn, it is not surprising that it should contain many millions of bacteria to a cubic centimeter. They may enter the milk from the dust in the stable—a very fruitful source—or they may find entrance from the milker's hands or from droppings of fine particles of manure from the belly of the cow. These are among the most dangerous forms of bacteria found in milk. When bacteria once gain entrance into the milk, their growth is most rapid. In corroboration of this, the observation of Parsons[1] is most interesting and instructive. He writes as follows:

"There is more or less dust floating in the air of houses and

[1] Cornell Reading Course, December, 1905.

stables, and this dust is constantly settling. When it falls into milk, it carries bacteria with it. If the milk is warm, these bacteria multiply very rapidly; if the milk is cold, they may develop slowly, but they will be ready for rapid growth as soon as the temperature is raised. The production and care of good milk depend very much on the care taken to prevent dust from getting into it, and the maintaining of a low temperature after it is drawn.

"Last summer, Walter E. King, of the State Veterinary College, and myself [Parsons], made a number of tests to determine the importance of different sources of milk contamination. In most of these tests a definite quantity of sterilized milk at 98° F. was exposed to some one kind of contamination that we wished to test. The milk was then examined, and in that way we could obtain a fairly accurate idea of the extent of this particular kind of contamination. Some of the experiments and their results are as follows:

"1. *Exposure to Air in the Stable:* Two liters (about two quarts) of sterilized milk were placed in a sterile pail and exposed seven minutes to the stable air in a passageway behind the cows. This stable was doubtless cleaner than the average, and the air contained less dust than is often found in places where milk is being handled. Immediately after this exposure, the milk was 'planted,' and we found it to contain 2800 bacteria per cubic centimeter (about fifteen drops); in other words, between 5,000,000 and 6,000,000 bacteria had fallen into the two liters of milk in this short time.

"2. *Pouring of Milk:* When milk is poured from one vessel into another, a very large surface is exposed to the air, and great numbers of bacteria are swallowed up. The following tests illustrate this point: About five liters of milk were poured from one can to another eight times in the stable air. It was found, after pouring, that this milk contained practically 100 bacteria per cubic centimeter more than it contained before pouring; in other words, about 600,000 bacteria had gotten into the milk on account of this exposure.

"In another similar experiment, when there was a little more dust in the air, the contamination due to pouring eight times was two and one-half times greater than in the preceding experiment.

"3. *Contaminated Utensils:* Much contamination of milk results from putting it into dishes that have been cleaned and then exposed where dust can fall into them. In experiments to determine what this kind of contamination amounts to, it has been found that when little care is taken to protect the dishes, the milk will often contain several hundred times as many bacteria as when the utensils were protected from dust. In order to illustrate this point, two pails were carefully washed and sterilized. One of them was covered with sterile cloth to keep dust from falling into it. The other was left exposed for only a few minutes to the air of a clean creamery.

A small quantity of sterile milk was then put into each pail, rinsed around, and then examined for bacteria. It was found that the milk in the pail which was not protected from dust contained 1600 more bacteria per cubic centimeter than the milk in the protected pail.

"4. *Contamination from the Cow's Udder and Body:* Great numbers of bacteria fall into the milk when it is being drawn, because the milking-pail is directly under the udder, which is being shaken more or less by the milker. This kind of contamination may be reduced by cleaning the udder. For example, it was found that sterile milk, exposed under the udder as long as it takes to milk a cow, while the udder was being shaken about the same as when milk is being drawn, contained 19,000 bacteria per cubic centimeter.

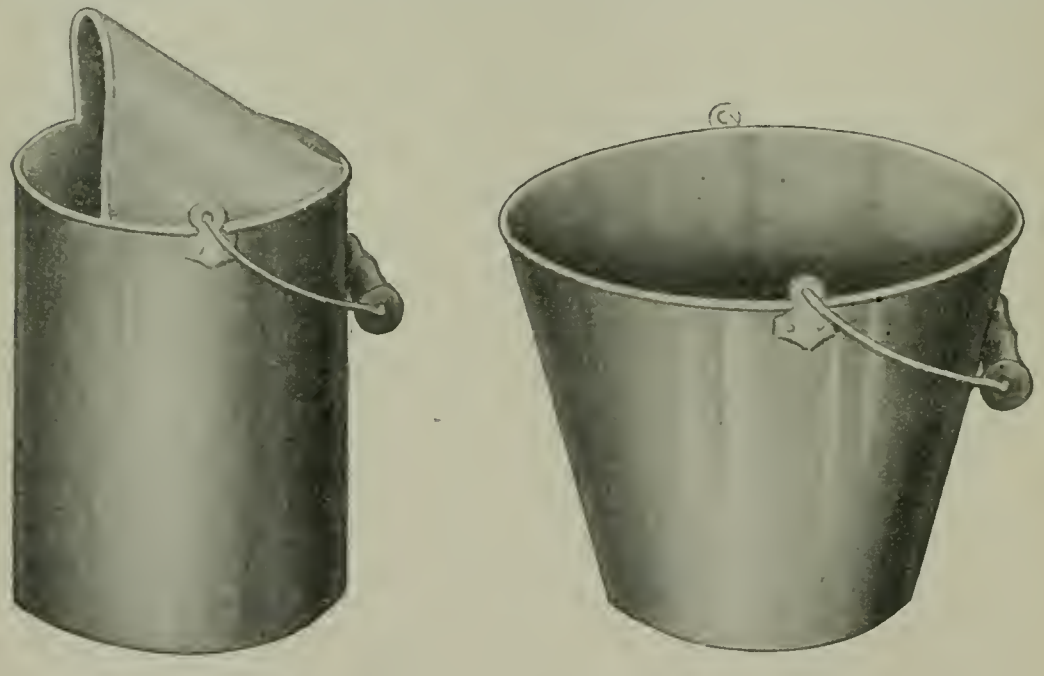


Fig. 10.—New. Fig. 11.—Old.

FIGS. 10, 11.—MILK PAILS.

In this case the udder had been wiped off with a dry cloth in much the same way as is done in fairly good dairies.

"In a similar test the udder was wiped with a damp cloth, when the number of bacteria was reduced to 4500 per cubic centimeter. In a third experiment the udder was wiped with a cloth dampened in a 4 percent carbolic acid solution, when the number of bacteria was found to be 3200 per cubic centimeter. In cases where no particular care is taken to clean the udder, the bacteria getting into the milk from this source may run up into the millions.

"5. *Importance of Small Openings in Milk Pails:* (See Fig. 10.) From the experiments above mentioned, it will be seen that it is impracticable to clean the udder or free the air from dust so perfectly that no bacteria will fall into the milk. The next question is,

How can we reduce the number of those that will fall in, despite all reasonable precautions? The easiest way known is to use a small-top milking-pail, thus reducing the size of the opening through which dirt can fall in. An experiment to illustrate this point showed that milk drawn into an ordinary milking-pail (Fig. 11) contained 1300 bacteria per cubic centimeter; while that drawn into a pail with an opening about one-half as wide, contained only 320 bacteria per cubic centimeter. This is exactly proportionate to the number of square inches of exposed surface in the two pails. For example, a pail having a circular top fourteen inches in diameter has an opening of 153.86 square inches; a pail with a twelve-inch top has an opening of 113.04 square inches; one with a ten-inch top has an opening of 79.79 square inches; and a pail with an opening six inches in diameter has an exposure of 28.26 square inches. (See Fig. 11.)

"Milkers should get into the habit of using the small-top pail, as it is one of the easiest of all ways of reducing the number of bacteria that fall into the milk.

"6. *Contamination by Flies:* A fly or a bit of hay or straw or a piece of sawdust or a small hair may carry enormous numbers of bacteria into milk, as is shown by the following experiments:

"A living fly was introduced into 500 c.c. of sterile milk. The milk was shaken one minute, when it was found to contain 42 bacteria per cubic centimeter. After twenty-four hours at room-temperature, it contained 765,000 bacteria per cubic centimeter, and after twenty-six hours, 5,675,000.

"7. *Dirt in the Milk:* A piece of hay about two inches long was placed in 500 c.c. of sterile milk. The milk was shaken one minute, when it contained 3025 bacteria per cubic centimeter. After twenty-four hours at room-temperature, it contained 3,412,500 bacteria per cubic centimeter.

"One piece of sawdust from the stable floor was put into 500 c.c. of sterile milk. The milk was shaken one minute and its bacterial content was then found to be 4080 per cubic centimeter. After twenty-four hours at room-temperature it was 7,000,000 per cubic centimeter.

"A hair from a cow's flank was put into 500 c.c. of sterile milk. After shaking the milk for one minute it contained 52 bacteria per cubic centimeter. After twenty-four hours at room-temperature it contained 55,000 per cubic centimeter, and after thirty-six hours, over 5,000,000 bacteria per cubic centimeter."

The results of the foregoing observations are given in detail, in order to impress upon the reader the necessity of exerting his energies to the end that the infants under his care may receive a less contaminated milk-supply.

Market Milk.—The legal standards for pure milk in most instances relate only to the chemical composition of the milk. The laws of

most of the States call for 12 percent of total solids, and at least 3 percent of fat. If the milk contains less than these percentages it is considered impure, even if it is just as it was when it left the cow's udder. Some cows give milk considerably below this standard. The chemical analysis of milk does not show whether it is suitable for use as an infant food, this point being decided according to its freshness and the care with which it has been handled with reference to the exclusion of bacteria and the prevention of their growth.

The production of clean, safe milk is expensive. It costs at least two cents a quart to produce milk, without allowing anything for the labor of caring for the cows. The milk must be carried to the consumer, which is also expensive. Yet, in New York city, milk that possesses the legal requirements retails in the grocery stores, during the summer months, at $3\frac{1}{2}$ cents a quart—two quarts for seven cents. This milk is known as "grocery milk," and is a very poor food for infants. It is teeming with bacteria, as little care is taken in its production.

The next grade of milk is sold in quart bottles which have been filled in the country, packed in cracked ice, and shipped to the city. The milk contains many bacteria, but is far better than grocery milk. It is retailed to the consumer for about eight cents a quart.

Certified Milk.—The best grade of milk, and the one which should be used in feeding infants whenever possible, is known as "certified milk," and is produced under the direction of what is known as a "milk commission." The establishing of "milk commissions" in different cities throughout the country has been the means of securing a much better milk-supply than was formerly possible, and has unquestionably been instrumental in saving thousands of lives. To Dr. H. L. Coit, of Newark, N. J., is due the credit of organizing the first milk commission. Certified milk must conform to certain standards as to its nutritional value and as to the number of bacteria per cubic centimeter. These standards are established by a committee of medical men who compose the milk commission and who have complete control of the dairy and its entire output.

The Milk Commission of the New York County Medical Society required a standard of milk not exceeding 30,000 bacteria in a cubic centimeter. When a dairyman has shown to the satisfaction of the Commission that he can produce a milk up to the required standard, he is allowed to attach to his bottles of milk labels furnished by the Commission certifying to that fact. Milk thus "certified" is taken from the delivery wagons from time to time and subjected to examination by their bacteriologist in order to determine whether it conforms to the requirements of the Commission. In order to show the care and supervision necessary for the production of certified milk, the requirements of the Milk Commission of the New York

County Medical Society for the Production of "certified milk" are given in full:[1]

"The most practicable standard for the estimation of cleanliness in the handling and care of milk is its relative freedom from bacteria. The Commission has tentatively fixed upon a maximum of 30,000 germs of all kinds per cubic centimeter of milk, which must not be exceeded in order to obtain the indorsement of the Commission. This standard must be attained solely by measures directed toward scrupulous cleanliness, proper cooling, and prompt delivery. The milk certified by the Commission must contain not less than 4 percent of butter fat on the average, and must possess all the other characteristics of pure, wholesome milk.

"In order that dealers who incur the expense and take the precautions necessary to furnish a truly clean and wholesome milk may have some suitable means of bringing these facts before the public, the Commission offers them the right to use caps on their milk jars stamped with the words: 'Certified by the New York County Medical Society Milk Commission.'

"Rules for the Producer.—1. *The Barnyard.*—The barnyard should be free from manure and well drained, so that it may not harbor stagnant water. The manure which collects each day should not be piled close to the barn, but should be taken several hundred feet away. If these rules are observed not only will the barnyard be free from objectionable smell, which is always an injury to the milk, but the number of flies in summer will be considerably diminished. These flies, in themselves, are an element of danger; for they are fond of both filth and milk, and are liable to get into the milk after having soiled their bodies and legs in recently visited filth, thus carrying it into the milk. Flies also irritate cows, and by making them nervous reduce the amount of their milk.

"2. *The Stable.*—In the stable the principles of cleanliness must be strictly observed. The room in which the cows are milked should have no storage loft above it; where this is not feasible, the floor of the loft should be tight, to prevent the sifting of dust into the stable beneath. The stable should be well ventilated, lighted, and drained, and should have tight floors, preferably of cement. They should be whitewashed inside at least twice a year, and the air should always be fresh and without bad odor. A sufficient number of lanterns should be provided to enable the necessary work properly to be done during dark hours. There should be an adequate water-supply and the necessary wash-basins, soap, and towels. The manure should be removed from the stalls twice daily, except when the cows are outside in the fields the entire time between the morning and afternoon milkings. The manure gutter must be kept in a sanitary condition, and all sweeping and cleaning must be finished at least

[1] Chapin: "Infant Feeding."

twenty minutes before milking, so that at that time the air may be free from dust.

"3. *Water-supply.*—The whole premises used for dairy purposes, as well as the barn, must have a supply of water absolutely free from any danger of pollution with animal matter, sufficiently abundant for all purposes, and easy of access.

"4. *The Cows.*—The cows should be examined at least twice a year by a skilled veterinarian. Any animal suspected of being in bad health must be promptly removed from the herd and her milk rejected. Never add an animal to the herd until it has been tested for tuberculosis and it is certain that it is free from disease. Do not allow the cows to be excited by hard driving, abuse, loud talking, or any unnecessary disturbance. Do not allow any strongly flavored food, like garlic, which will affect the flavor of the milk, to be eaten by the cows.

"Groom the entire body of the cow daily. Before each milking wipe the udder with a clean, damp cloth, and, when necessary, wash it with soap and clean water and wipe it dry with a clean towel. Never leave the udder wet, and be sure that the water and towel used are clean. If the hair in the region of the udder is long and not easily kept clean, it should be clipped. The cows must not be allowed to lie down, after being cleaned for milking, until the milking is finished. A chain or rope must be stretched under the neck to prevent this.

"All milk from cows sixty days before and ten days after calving must be rejected.

"5. *The Milkers.*—The milker should be personally clean. He should neither have nor come in contact with any contagious disease while employed in milking or handling milk. In case of any such illness in the person or family of any employee in the dairy, such employee must absent himself from the dairy until a physician certifies that it is safe for him to return.

"Before milking, the hands should be thoroughly washed in warm water with soap and a nail-brush and well dried with a clean towel. On no account should the hands be wet during the milking.

"The milking should be done regularly at the same hour morning and evening, and in a quiet, thorough manner. Light-colored washable outer garments should be worn during milking. They should be clean and dry, and when not in use for this purpose should be kept in a clean place protected from dust. Milking-stools must be kept clean. Iron stools, painted white, are recommended.

"6. *Helpers Other than Milkers.*—All persons engaged in the stable and dairy should be reliable and intelligent. Children under twelve years should not be allowed in the stable during milking, since in their ignorance they may do harm, and from their liability

to contagious diseases they are more apt than older persons to transmit them through the milk.

"7. *Small Animals.*—Cats and dogs must be excluded from the stable during the time of milking.

"8. *The Milk.*—The first few streams from each teat should be discarded, in order to free the milk-ducts from milk that has remained in them for some time and in which bacteria are sure to have multiplied greatly. If, in any milking, a part of the milk is bloody or stringy or unnatural in appearance, the whole quantity of milk yielded by that animal must be rejected. If any accident occurs by which the milk in a pail becomes dirty, do not try to remove the dirt by straining, but reject all the milk and cleanse the pail. The milk-pails used should have an opening not exceeding eight inches in diameter.

"Remove the milk of each cow from the stable, immediately after it is obtained, to a clean room, and strain it through a sterilized strainer.

"The rapid cooling of milk is a matter of great importance. The milk should be cooled to 45° F. within one hour. Aëration of pure milk beyond that obtained in milking is unnecessary.

"All dairy utensils, including bottles, must be thoroughly cleansed and sterilized. This can be done by first thoroughly rinsing in warm water, then washing with a brush and soap or other alkaline cleansing material and hot water, and thoroughly rinsing. After this cleansing, they should be sterilized with boiling water or steam, and then kept inverted in a place free from dust.

"9. *The Dairy.*—The room or rooms where the bottles, milk-pails, strainers, and other utensils are cleaned and sterilized should be separated somewhat from the house, or when this is impossible have at least a separate entrance, and be used only for dairy purposes, so as to lessen the danger of transmitting through the milk contagious diseases which may occur in the home.

"Bottles, after filling, must be closed with sterilized discs and capped so as to keep all dirt and dust from the inner surface of the neck and mouth of the bottle.

"10. *Examination of the Milk and Dairy Inspection.*—In order that the dealers and the Commission may be kept informed of the character of the milk, specimens taken at random from the day's supply must be sent weekly to the Research Laboratory of the Health Department, where examinations will be made by experts for the Commission, the Health Department having given the use of its laboratories for this purpose.

"The Commission reserves to itself the right to make inspections of certified farms at any time and to take specimens of milk for examination. It also reserves the right to change its standards in any reasonable manner upon due notice being given the dealers."

Naturally, milk produced in this way is more expensive than when little or no care is used, more help is required, and help of a more expensive type. Certified milk, or its equivalent, is sold in New York city at prices ranging from twelve to eighteen cents a quart.

Examination of Cow's Milk.—In cow's milk, as in human milk, a chemical analysis is necessary in order to know accurately the nutritional elements. The specific gravity varies from 1.029 to 1.035. Milk is acid in reaction to phenolphthalein, and may be neutral to litmus. The Babcock milk-test machine is what is generally employed in examining cow's milk in laboratories and institutions. The test consists in mixing the milk with strong sulphuric acid which dissolves the proteids and liberates the fat, the quantity of which is read off from the graduated neck of the bottle used in mixing the milk and acid. Only the fat is determined in this way. Knowing the fat and the specific gravity, the solids other than fat may readily be determined by adding to one-fourth of the specific gravity, reading to the right of the decimal point, one-fifth of the percentage of fat.

Modified Milk.—At one time it was thought that by changing the percentage composition of cows' milk and altering the reaction, it could be made practically identical with human milk, and the term "modified milk" was applied to cows' milk so manipulated; but a great variety of manipulations of cows' milk has been introduced, which often differs greatly in the principles involved. Yet to products of all these different manipulations the term "modified milk" is applied. It may mean any one of a dozen or more different products. When cows' milk is diluted with water and given as a food to an infant, he is given "modified milk." When sugar, cereal gruel, lime water, bicarbonate of sodium, or citrate of sodium is added, it is still "modified milk." When a prescription is sent to the laboratory calling for definite amounts of fat, sugar, and proteids, the product furnished is "modified milk." When a mother is told to use a definite amount of cream, milk, sugar, and water, "modified milk" is also the outcome.

As a matter of fact, successful infant feeding consists in what I have termed "milk adaptation," that is, modifying the milk to suit the case in hand. The routine prescriber is content to prescribe "modified milk," that which was originally supposed to be an imitation of human milk. The best informed prescriber uses "an adapted modified milk," which he decides is indicated.

The analysis of mixed dairy milk shows it to contain approximately:

4.0 percent fat;
4.0 percent sugar;
3.5 percent total proteid.

Human milk contains approximately:

4.0 percent fat;
7.0 percent sugar;
1.5 percent total proteid.

The Aim of Milk Modification.—The first thought in the modification is grossly to make the chief nutritional elements in the food prepared from cow's milk correspond to the nutritional elements in the human milk. The proteid must be reduced, the sugar increased, and the fat reduced even slightly below that usually found in mother's milk, as the child's digestive capacity for cow's-milk fat is less by from 15 to 25 percent than it is for human milk.

The Proteid.—The proteid element in an infant's food is its chief nutritional content. This has to be reduced to approximately the proportions that exist in human milk, and can be accomplished only by dilution. The diluent may be plain water or it may be a cereal gruel. The average cow's milk contains, as just mentioned:

4.0 percent fat;
4.0 percent sugar;
3.5 percent total proteid.

If eight ounces of milk is mixed with eight ounces of water, we get a pint mixture with an approximate nutritional equivalent of:

2.0 percent fat;
2.0 percent sugar;
1.75 percent total proteid.

If four ounces of milk is mixed with twelve ounces of water we have a sixteen-ounce mixture with an approximate nutritional equivalent of:

1.0 percent fat;
1.0 percent sugar;
0.9 percent total proteid.

If six ounces of milk is mixed with ten ounces of water a sixteen-ounce mixture is produced with an approximate nutritional equivalent of:

1.5 percent fat;
1.5 percent sugar;
1.3 percent total proteid.

By this simple dilution with water it may be seen that the desired proteid content of the food may be arrived at.

The Sugar.—For nourishment for an infant, however, the mixture is weak in fat and very weak in sugar. The sugar content is increased by the addition of milk-sugar or cane-sugar. It will be remembered

that with human milk there is a sugar content of 7 percent. The combination of full cow's milk and water as above gives a sugar content of 2 percent or less, so that sufficient sugar must be added to make the increase approximately 7 percent. What is necessary, then, is to increase the sugar content 5 percent. A 1 percent sugar and water mixture would contain approximately five grains of sugar to the ounce. A 6 percent sugar mixture would contain thirty grains to the ounce, and as our dealings are with a sixteen-ounce mixture we will require an addition of sixteen times thirty grains of sugar of milk, or 480 grains, so that if we direct that a pint mixture contain 6 ounces of a 4, 4, 3.50 milk, 10 ounces water, 1 ounce milk-sugar, there would be an approximate nutritional equivalent of:

FIG. 12.—THE CHAPIN DIPPER.

1.5 percent fat;
7.5 percent sugar;
1.3 percent total proteid.

Or if it were 4 ounces milk, 12 ounces water, 1 ounce milk-sugar, there would be an approximate nutritional equivalent of:

1.0 percent fat;
7.0 percent sugar;
0.9 percent total proteid.

The Fat.—While a child of from two to four months might thrive on the above formulas, the fat is obviously deficient and needs to be increased. This is accomplished by the use of cream. Cream of the same age as the milk should be used. When this method of feeding is carried out, in order to secure a suitable cream, a quart bottle of milk from a mixed herd of grade cows is allowed to stand at a temperature of 40° or 50° F. for five hours, when a cream which will be referred to as "*gravity cream*" (page 111) will be produced of the approximate strength of:

16.0 percent butter fat;
3.2 percent sugar;
3.2 percent total proteid.

These were the percentages obtained in an analysis made for me from the Walker-Gordon Laboratory milk, which is produced by grade cows and represents an average milk strength as regards the nutritional elements, and may therefore be taken as a guide in using gravity cream for infant-feeding. Cream from well-fed Jersey cows procured in this way will contain from 20 to 24 per-

cent of fat. One ounce of gravity cream with fifteen ounces of water gives a pint mixture with a nutritional equivalent of:

1.0 percent fat;
0.2 percent sugar;
0.2 percent total proteid.

Two ounces of gravity cream and fourteen ounces of water give an approximate nutritional equivalent of:

2.0 percent fat;
0.4 percent sugar;
0.4 percent total proteid.

We now wish by using gravity cream to raise the fat in the milk and sugar-water mixtures given above. In using the cream all must be removed and mixed, as the upper layers in the bottle are much richer in fat than those nearer the milk. For this skimming process the Chapin dipper (Fig. 12) is employed. Milk which is rapidly cooled immediately after being drawn and kept at a temperature of 50° F. or lower may be skimmed at the end of five hours, when all the cream that will rise will have done so.

Illustrative Food Formulas.

Gravity cream	1	ounce	Approximate Percentage Equivalent.
Milk	4	ounces	Fat 2.0
Milk-sugar	1	ounce	Sugar 7.2
Water	11	ounces	Total proteid 1.1

Gravity cream	2	ounces	Approximate Percentage Equivalent.
Milk	4	ounces	Fat 3.0
Milk-sugar	1	ounce	Sugar 7.4
Water	10	ounces	Total proteid 1.3

In the event of a weak proteid digestion in a young baby, gravity cream alone may be used temporarily; thus 3 ounces cream, 1 ounce milk-sugar, 12 ounces water, 1 ounce lime-water, which mixture gives an approximate nutritional equivalent of:

3.0 percent fat;
6.6 percent sugar;
0.6 percent total proteid.

Or if a weaker food is desired for a younger infant, we may use 2 ounces gravity cream, 1 ounce milk-sugar, 13½ ounces water, ½ ounce lime-water, which mixture gives an approximate equivalent of:

2.0 percent fat;
6.4 percent sugar;
0.4 percent total proteid.

In the event of a good proteid digestion and poor fat digestion, full milk alone with sugar and water is to be used; thus 5⅓ ounces milk,

10 ounces water, 1 ounce milk-sugar, $1\frac{2}{3}$ ounces lime-water, which mixture gives an approximate equivalent of:

1.33 percent fat;
7.33 percent sugar;
1.17 percent total proteid.

Average skimmed milk with the gravity cream removed contains about 1 percent fat, 3.5 percent sugar, and 3 percent proteid. If for any reason a particularly weak fat food is required, skimmed milk may be used: $5\frac{1}{3}$ ounces skimmed milk, 9 ounces water, 1 ounce milk-sugar, $1\frac{2}{3}$ ounces lime-water, which mixture gives an approximate equivalent of:

0.33 percent fat;
7.17 percent sugar;
1.00 percent total proteid.

If a stronger skimmed milk mixture is required, it may be prepared as follows: 8 ounces skimmed milk, 8 ounces water, 1 ounce milk-sugar, which mixture gives an approximate nutritional equivalent of:

0.50 percent fat;
7.75 percent sugar;
1.50 percent total proteid.

It will thus be seen that with milk, cream, and sugar of milk every possible form of food strength may be made. If lime-water is used, it simply takes the place of the milk diluent and replaces so much water. This method of milk preparation is more accurate than when top-milk mixtures are used, but it has the disadvantage of requiring two quarts of milk during the entire feeding period, one to supply the milk and the other the cream, all of which must be removed and mixed before any of it is used in the food.

The following formulas for the different ages may be found useful for well babies:

From the first to the third day:

Milk-sugar	$\frac{1}{2}$ ounce
Boiled water	16 ounces

$\frac{1}{4}$ to 1 ounce every two or three hours;

which mixture gives an approximate nutritional equivalent of 3 percent sugar.

From the third to the tenth day:

Gravity cream	$\frac{1}{2}$ ounce
Milk	3 ounces
Milk-sugar	1 ounce
Lime-water	$\frac{1}{2}$ ounce
Boiled water to make	16 ounces

Approximate Percentage Equivalent.	
Fat	1.25
Sugar	6.85
Total proteid	.75

Ten feedings in twenty-four hours; 1 to $1\frac{1}{2}$ ounces at each feeding.

From the tenth to the twenty-first day:

		Approximate Percentage Equivalent.	
Gravity cream	1¼ ounces	Fat	1.7
Milk	5 ounces	Sugar	7.0
Milk-sugar	1½ ounces	Total proteid	0.89
Lime-water	½ ounce		
Water to make	24 ounces		

Nine to ten feedings in twenty-four hours; 1½ to 2 ounces at each feeding.

From the third to the sixth week:

		Approximate Percentage Equivalent.	
Gravity cream	2½ ounces	Fat	2.25
Milk	8 ounces	Sugar	7.25
Milk-sugar	2 ounces	Total proteid	1.13
Lime-water	2 ounces		
Water to make	32 ounces		

Eight to nine feedings in twenty-four hours; 2 to 3 ounces at each feeding.

From the sixth week to the third month:

		Approximate Percentage Equivalent.	
Gravity cream	3 ounces	Fat	2.6
Milk	9 ounces	Sugar	7.4
Milk-sugar	2 ounces	Total proteid	1.3
Lime-water	2½ ounces		
Water to make	32 ounces		

Seven to eight feedings in twenty-four hours; 2½ to 4 ounces at each feeding.

From the third to the fifth month:

		Approximate Percentage Equivalent.	
Gravity cream	4 ounces	Fat	3.1
Milk	15 ounces	Sugar	6.8
Milk-sugar	2 ounces	Total proteid	1.6
Lime-water	4 ounces		
Water to make	40 ounces		

Six to seven feedings in twenty-four hours; 4 to 5 ounces at each feeding.

From the fifth to the seventh month:

		Approximate Percentage Equivalent.	
Gravity cream	5 ounces	Fat	3.6
Milk	18 ounces	Sugar	6.6
Milk-sugar	2 ounces	Total proteid	1.9
Lime-water	5 ounces		
Water to make	42 ounces		

Six feedings in twenty-four hours; 5 to 7 ounces at each feeding.

After the fifth month it is my custom to add from one to three teaspoonfuls of a cereal jelly to each feeding. This may be added to the milk mixture when it is made in the morning. Thus, if one teaspoonful is to be given at each feeding where a child is getting six feedings, six teaspoonfuls of the jelly may be added to the entire quantity.

From the seventh to the ninth month:

		Approximate Percentage Equivalent.	
Gravity cream	6 ounces	Fat	3.9
Milk	23 ounces	Sugar	6.5
Milk-sugar	2 ounces	Total proteid	2.1
Lime-water	6 ounces		
Water to make	48 ounces		

Five to six feedings in twenty-four hours; 6 to 8 ounces at each feeding. Five feedings in twenty-four hours usually answer better at this age.

From the ninth to the twelfth month:

Gravity cream	7 ounces	Approximate Percentage Equivalent.	
Milk	32 ounces	Fat	4.28
Lime-water	6 ounces	Sugar	7.25
Milk-sugar	2½ ounces	Total proteid	2.4
Water to make	56 ounces		

Five to six feedings in twenty-four hours; 7 to 9 ounces at each feeding.

Top-milk Feeding.—In using top-milk for infant-feeding the milk is allowed to stand in a quart bottle at a temperature of 45° to 50° F. for the same length of time as when gravity cream is desired—five hours—when the quantity needed is removed from the top of the bottle with a Chapin dipper (Fig. 12) and diluted as desired with water or gruel to which sugar of milk and lime-water are added. The milk selected should be the cleanest obtainable from grade cows; usually the most expensive is the best. If so-called "certified milk" (page 88) is obtainable, it should be used, as this warrants a cleaner food than that furnished by the usual market milks.

From a quart bottle of milk on which the cream has risen, dip from the top with a Chapin dipper *sixteen ounces* and mix. From average milk this should contain:

7.0 percent fat;
3.2 percent sugar;
3.2 percent total proteid.

The following top-milk formulas are suggested for the various ages noted:

From the third to the tenth day:

Milk (top 16 oz.)	3 ounces	Approximate Percentage Equivalent.	
Lime-water	½ ounce	Fat	1.3
Milk-sugar	1 ounce	Sugar	6.6
Boiled water to make	16 ounces	Total proteid	0.6

Ten feedings in twenty-four hours; 1 to 1½ ounces at each feeding.

From the tenth to the twenty-first day:

Milk (top 16 oz.)	6 ounces	Approximate Percentage Equivalent.	
Lime-water	1½ ounces	Fat	1.75
Milk-sugar	1½ ounces	Sugar	6.8
Water to make	24 ounces	Total proteid	0.8

Nine to ten feedings in twenty-four hours; 1½ to 2 ounces at each feeding.

From the third to the sixth week:

Milk (top 16 oz.)	10 ounces	Approximate Percentage Equivalent.	
Lime-water	2½ ounces	Fat	2.2
Milk-sugar	2 ounces	Sugar	7.0
Water to make	32 ounces	Total proteid	1.0

Eight to nine feedings in twenty-four hours; 2 to 3 ounces at each feeding.

From the sixth week to the third month:

Milk (top 16 oz.)	12 ounces	Approximate Percentage Equivalent.	
Milk-sugar	2 ounces	Fat	2.6
Lime-water	3 ounces	Sugar	7.2
Water to make	32 ounces	Total proteid	1.2

Seven to eight feedings in twenty-four hours; 2½ to 4 ounces at each feeding.

From the third to the fifth month:

After this age two bottles of milk are required, 16 ounces being taken from the top of each bottle and mixed. At this time a cereal jelly is usually added to the food (page 97).

Milk (top 16 oz.)	18 ounces	Approximate Percentage Equivalent.	
Milk-sugar	2 ounces	Fat	3.15
Lime-water	4 ounces	Sugar	6.4
Water to make	40 ounces	Total proteid	1.4

Six feedings in twenty-four hours; 4 to 5 ounces at each feeding.

From the fifth to the seventh month:

Milk (top 16 oz.)	21 ounces	Approximate Percentage Equivalent.	
Milk-sugar	2 ounces	Fat	3.50
Lime-water	5 ounces	Sugar	6.4
Water to make	42 ounces	Total proteid	1.6

Six feedings in twenty-four hours; 5 to 7 ounces at each feeding.

From the seventh to the ninth month:

Milk (top 16 oz.)	27 ounces	Approximate Percentage Equivalent.	
Milk-sugar	2½ ounces	Fat	3.9
Lime-water	6 ounces	Sugar	7.0
Water to make	48 ounces	Total proteid	1.8

Five to six feedings in twenty-four hours; 6 to 8 ounces at each feeding.

From the ninth to the twelfth month:

Milk (top 16 oz.)	35 ounces	Approximate Percentage Equivalent.	
Milk-sugar	2½ ounces	Fat	4.3
Lime-water	6 ounces	Sugar	6.5
Water to make	56 ounces	Total proteid	2.0

Five to six feedings in twenty-four hours; 7 to 9 ounces at each feeding.

After the twelfth month, plain cow's milk may be given with the cereal jelly in addition to the other articles of diet suggested for a child one year old. (See page 134.)

It will be noticed that considerable latitude is allowed as to the amount of food which may be given at each feeding. This is because of the difference in the capacity of individual children. It will be observed that the total quantity of food prepared is several ounces more than it is supposed the child will take in twenty-four hours. This extra amount often serves a most useful purpose when a bottle is broken or the food is otherwise lost. The average well child will require about thirty ounces of a suitably adapted food at the third month. He will need about thirty-six ounces at the sixth month and forty to forty-five ounces at the ninth to the twelfth month.

Night Feedings.—After the third month the midnight feeding should be discontinued. Six feedings will be sufficient, the first at 6 A. M. and the last at 10.30 or 11 P. M.

Between 11 P. M. and 6 A. M. the child should sleep. Babies are easily broken from the night bottle by substituting a bottle of

boiled water or a milk mixture greatly diluted with water. The child soon discovers that this is not worth waking for. As a result of a full night's rest the digestive organs are better able to do their work, the appetite is increased, and a larger amount of food may be given at each feeding.

Changes Needed for Special Symptoms.—When the milk does not agree, the cause must be discovered. The food as a whole may be too strong, when there will be indigestion and colic, and possibly *diarrhea and vomiting.* If the food contains too much fat, there will be *looseness of the bowels and colicky stools*, with considerable straining, and there is apt to be *regurgitation* also. The sugar is rarely a cause of trouble, indications of excess being the *eructation of gas* and a *regurgitation of sour, watery material.* It is comparatively rare, however, for the fat and sugar to cause any disturbance if they are given with any degree of intelligence; but the casein, the curd-forming element in cow's milk, often gives us no end of trouble. Many infants, as previously stated, are able to digest only a very weak cow's-milk casein; consequently, at the beginning of cow's-milk feeding, when, as is often the case, too much milk is used—too strong a food given—the result is always disastrous. This, with too frequent feedings and night feedings, comprise the chief errors made in cow's-milk feeding—in fact, they are the cause of more bottle-feeding failures than all other factors combined.

The Quality of Milk Variable.—It is not claimed that the nutritional value as indicated by the percentage equivalents in either of the above series is absolutely correct. Milks necessarily differ in composition. Only mixed dairy milk is referred to, the product of several grade cows. The feeding of the cows and their care also influence the quality of the milk. The percentages indicated give approximately the nutritional value and are sufficiently accurate for purposes of supplying satisfactory nutrition to well babies of the various ages, as I have abundantly proved to my own satisfaction. The fats will not be found too low for proper nutrition in any of the formulas given. They may be too high for proper digestion and require adjustment. The proteids as given are sufficient for nutrition if they are assimilated. They also may require reduction to meet special conditions which are referred to under Milk Adaptation (page 105). The adjustment of the food to the individual, constitutes what I have termed "Milk Adaptation," and suggestions for making the food fit the child's digestive capacity will be found under that caption.

Laboratory Feeding.—To Rotch, of Boston, we are indebted for the establishment of the practice of thinking in percentages in the feeding of infants and for the establishment of milk laboratories which mark an epoch in the feeding of infants. Haphazard methods

of feeding have been superseded by methods which rest upon a scientific basis. The change for the better has been slow but effectual, so that all who now teach or practise pediatrics successfully must think in percentages and feed accordingly. The advantages of using the milk of a properly conducted laboratory are accuracy in the nutritional content in the food furnished and cleanliness. It also lightens the household duties, the milk being delivered every morning ready for use. The physician sends the prescription to the laboratory on such a prescription blank as that shown below:

℞.	Percent.	
Fat.....		Number of feedings_____
Milk-sugar.....		Amount of each feeding_____
Proteids.....		In Qt. Jar_____
Lime-water.....		Heat to_____° F.
Diluent.....		

Ordered for_____

_____

_____

Date Signature

_____ _____M.D.

The milk thus is delivered in quart bottles or in as many nursing bottles as there are feedings in twenty-four hours, each bottle containing the number of ounces called for.

A further advantage possessed by the laboratory is that in very difficult cases of proteid feeding a finer adjustment is possible than is the case with home-made preparations, a very valuable aid in the feeding of such cases. A splitting up of the proteid by using whey proteid is here more accurately accomplished than is possible in the home. Unfortunately, the product of milk laboratories, on account of the expense of equipment and maintenance, together with the expense of producing a high-grade milk at the farm, is rendered so expensive to the consumer that it is available to comparatively few.

A Convenient Means for Home Modification.—A measuring glass has recently been placed on the market, known as the Deming percentage milk modifier (Fig. 13). The device is a pint graduate provided with a column of figures in red representing percentages of proteid, and several other columns representing percentages of fat. The fat percentages in one column are to be obtained by using whole milk, in another 7 percent milk, in

another 10 percent, etc. At the head of each column are directions showing how such a milk may be obtained from a quart bottle of milk. The figures representing proteid percentages are so placed on the glass that when milk is poured into the graduate up to the level of any set of figures and diluent added up to the sixteen-ounce mark, the resulting mixture will contain a percentage of proteid corresponding to the red figure at the first level and a percentage of fat corresponding to the figures at that level in the column which represents the kind of milk used. For example, if whole milk is poured in up to the red (proteid) mark 2 and diluent added to sixteen ounces, the fat percentage will be 2.5, which is the figure at the same level as the proteid percentage, and under the whole-milk column. Or if 7 percent milk is used, 4.4 percent, and if 10 percent, 6.2 percent, etc.

The Feeding of Dispensary Patients.—The feeding of cow's milk according to one or more of the above methods is the best means of furnishing infant nutrition. The laboratory, the milk and cream, or the top-milk methods all pediatrists are agreed have proved the best means of applying substitute feeding. That a great majority of infants may be fed in this way, if they are properly handled by a suitable adjustment, there is not the slightest doubt, but where there is a majority, there is also a minority, and a goodly portion of this minority who reside in large cities and the suburbs of large cities fall into the hands of the pediatrist either in hospital, in out-patient, or in private work. Economic questions oftentimes govern the selection of the food. Physicians who have an invariable system of feeding must of necessity have but one type of patients to deal with.

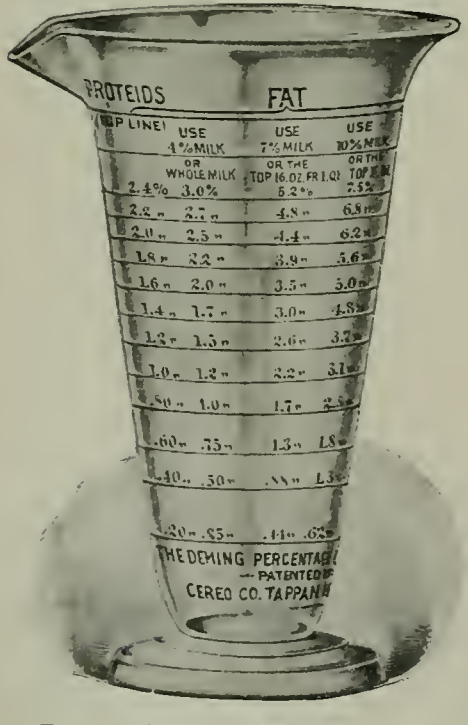


FIG. 13.—DEMING'S MILK MODIFIER.

As loud as we may be in our advocacy of the ennobling principles of democracy, we cannot treat alike, as regards their feeding, all well children even in private practice. The child of a stupid mother cannot be fed as well or in the same way as the child of a reasonably intelligent mother in the same station of life. An infant of a very poor mother, whether she is dull or intelligent, cannot be fed to the infant's best advantage, for the reason—a very simple but effectual one—that the mother cannot afford cow's milk.

Among the out-patient class in New York city, the expensive milk is therefore entirely out of the question. I have treated many infants whose parents could not expend eight cents daily for a quart of milk.

The Patient's Limitations and How to Meet Them.—The Straus laboratories, which supply *pasteurized milk* to the poor of New York city, excellent as they are, are available to comparatively few. *Milk and cream combinations* are impossible oftentimes because of expense or because of inability to appreciate and carry out the details required for their proper use, so that in the out-patient poor class we have to feed either by top-milk methods or by the simple dilution of full milk with water and sugar or with a cereal gruel and sugar, while for the very poor, those who cannot afford cow's milk and ice, we are forced to use *condensed milk*. *The top-milk method* is available to but comparatively few of these mothers, even though the directions are carefully explained and printed instructions used. The use of top milks with many, while the method is very simple, is not readily understood, and it has usually been unsatisfactory. The dipper, a useful portion of the equipment, makes an extra utensil to be kept clean. Women who do all their own housework, take care of their own children, and perhaps take in outside work have but little time for attention to the details of infant-feeding. The easiest way, naturally, has for them many attractions. Among these patients my best success has been in the use of *full milk*. They know how to shake the bottle and measure out the milk and mix it with water or barley-water, in the amount to be fed to the baby. Further than this, their comprehension frequently does not extend, and, again, this is very easily done.

As will readily be perceived, the feeding of diluted full milk gives a food poor in fat. This we endeavor to make up by using three times a day one-half teaspoonful or one teaspoonful of pure cod-liver oil, for which there is no charge at the dispensary.

The following formulas and instructions for bottle-feeding are taken from the Rules for the Care of Infants and Young Children which are used in my service at the out-patient department of the Babies' Hospital, and give the simplest and easiest means of bottle-feeding.

"*Bottle-feeding:* The bottle should be thoroughly cleansed with borax and hot water (one tablespoonful of borax to a pint of water) and boiled before using. The nipple should be turned inside out, scrubbed with a brush, using hot borax water. The brush should be used for no other purpose. The bottle and nipple should rest in plain boiled water until wanted. Never use grocery milk. Use only bottled milk which is delivered every morning. From May 1st to October 1st the milk should be boiled five minutes immediately after receiving. Children of the same age vary greatly as to the strength and amount of food required. A mixture, when

prepared, should be put in a covered glass fruit-jar and kept on the ice. For the average baby the following mixtures will be found useful:

"*For a child under six weeks of age:* Nine ounces of milk, twenty-seven ounces of barley-water, four teaspoonfuls of granulated sugar. Feed from two to three ounces at two and one-quarter-hour intervals, nine feedings in twenty-four hours.

"*Sixth to the twelfth week:* Twelve ounces milk, twenty-four ounces barley-water, five teaspoonfuls sugar. Feed from three to four ounces at each feeding.

"*Third to the sixth month:* Eighteen ounces of milk, thirty ounces of barley-water, six teaspoonfuls of sugar. Feed four to six ounces at three-hour intervals, seven feedings in twenty-four hours.

"*Sixth to the ninth month:* Twenty-four ounces milk, twenty-four ounces barley-water, six teaspoonfuls granulated sugar. Feed six to eight ounces at three-hour intervals, six feedings in twenty-four hours.

"*Ninth to twelfth month:* Thirty-eight ounces milk, twelve ounces barley-water, six teaspoonfuls of granulated sugar. Feed seven to nine ounces at three and one-half hour intervals, five feedings in twenty-four hours.

"*Condensed Milk:* When the mother cannot afford to buy bottled milk from the wagon, when she has no ice-chest or cannot afford to buy ice, she should not attempt cow's-milk feeding, but may use canned condensed milk as a substitute during the hot months only. The can, when opened, should be kept in the coolest place in the apartment, carefully wrapped in clean white paper or in a clean towel. The feeding hours are the same as for fresh cow's milk.

"*Under three months of age:* Condensed milk one-half to one teaspoonful; barley-water, two to four ounces.

"*Third to sixth month:* Condensed milk, one to two teaspoonfuls; barley-water, four to six ounces.

"*Sixth to ninth month:* Condensed milk, two to three teaspoonfuls; barley-water, six to eight ounces.

"*Ninth to twelfth month:* Condensed milk, three teaspoonfuls; barley-water, eight to nine ounces."

A cereal water is used as a diluent in all of these cases, as it increases the nutritional value of the food. One-half ounce barley flour to a pint of water gives a nutritional equivalent of:

0.07 percent fat;
0.3 percent total proteid;
2.0 percent carbohydrate.

Changes Needed in Hot Weather.—It will be seen that the foregoing whole-milk formulas are poor in fat, as previously stated, but during the hot months they contain as much fat as the average tenement child can safely digest without danger of producing diarrhea. During the cooler months of the year the child is given

pure cod-liver oil from the dispensary in order to make up for the deficient fat content of the food. During the eight months from October 1st to June 1st the child is fed in this way. About June 1st the conditions of the family are investigated as to their ability to care for the milk during the hot weather. If they have ice-boxes and can afford ice they are instructed to continue with the milk, but instead of giving it raw, as previously, they are told to boil it three minutes. When they cannot supply sufficient ice to care for the milk, they are put into the condensed-milk class. A fairly satisfactory infant milk may be obtained in New York city for eight cents a quart. There are parents in New York, however, who cannot afford even this daily expenditure for the infant's milk, or who claim that they cannot, which amounts to the same thing, as far as the infant is concerned. The infant has to be fed. A ten-cent can of condensed milk will last an infant three days, and it will keep safely for use for that length of time after opening. It is always given in a cereal water diluent in order to increase its nutritive value, and pure cod-liver oil furnished by the dispensary is given eight months in the year to increase the daily amount of fat. This, of course, is anything but an ideal means of infant-feeding. Many children thrive on it, however, but they almost invariably show some signs of malnutrition, and offer less resistance to illness of every nature. In spite of these drawbacks it is the best food for a considerable number of children during the summer months under existing conditions in New York city.

Adapted Milk.—In adapting milk for infant-feeding the milk is not only "modified" (page 92), by which process the nutritional elements are changed in their proportions so as to make them conform as nearly as possible to mother's milk, but more is required —the food must be adapted to the child's digestive capacity.

If the modification of milk, as we formerly understood, constituted all that was required in infant-feeding, the artificial feeding of infants would be a comparatively simple matter. Some infants will take readily any reasonable modification which by experience has been found suitable for children of their age. In others, which includes the majority, the child fed on cow's milk has to be fed according to his digestive capabilities. Every feeding case must be studied from its own individual standpoint. How best to nourish the individual patient can be learned only by a study of the patient himself. No process of manipulation by the addition of chemicals or gruels can convert cow's milk into human milk. There are various means available, however, sufficient to overcome the existing differences, thereby making cow's milk a suitable food even for those who at first show signs of marked intolerance of it. The strength and the feeding intervals required for the different ages in average well children are found in the chapters on Modified Milk, page 92.

Symptomatic Adaptation.—If the child is getting a suitable food strength at proper intervals and the food causes illness, the difficulty may rest either with the food as a whole, it being beyond his digestive capacity, or there may be an incapacity for one or more of its nutritional elements. If the food as a whole is too strong, there is very apt to be vomiting, which may become habitual, or there may be colic or constipation or diarrhea. If the food as a whole is too weak, it will be evidenced by hunger, a failure to gain in weight, and usually by constipation. If sugar is given in excess—a comparatively rare cause of trouble, if not more than 7 percent of milk-sugar is given—it will be indicated by the regurgitation of sour, watery material. A sour odor to the patient's breath and to his clothing indicates sugar excess. There may not be pronounced vomiting in such a case, but the repeated regurgitation when the patient is awake is sufficient to deprive him of a goodly amount of his daily food, or the digestion of both fat and proteid may be markedly interfered with, and the whole digestion deranged as a result of what was primarily a sugar incapacity or sugar excess. When sugar is at fault, the indigestion may readily be corrected by washing out the stomach for a few days (page 191) and by reducing the sugar content of the food one-half. Later, after the condition is relieved, the sugar may gradually be increased to the normal percentage of seven. A child may be getting but a 2 percent cow's-milk-fat mixture and yet suffer from fat indigestion. Excessive fat or fat incapacity also gives rise to vomiting and regurgitation in which particles of fat may often be seen. Fat may cause also frequent green undigested stools, the passage of which is associated with marked tenesmus. Fat-diarrhea is often the outcome of fat-indigestion. Cow's-milk fat was not intended for babies, and when it disagrees we cannot change its character—our only method of adaptation is to reduce the amount given, the same as with the sugar.

Casein.—The casein in cow's milk is its important nutritional factor, and in adapting cows' milk to a child's digestive capacity it is oftentimes a most difficult factor to deal with. Temporarily it may be reduced with safety to a percentage considerably below that of cow's milk—to 0.25 percent, for instance—but it must be remembered that the patient cannot thrive or even long exist without this proteid element in the diet, so that a reduction will always be followed by malnutrition. It is necessary, then, to give proteid, and successful infant-feeding means that we must change it through adaptation to the child's digestive capacity, and this, fortunately, is oftentimes possible.

The Use of Alkalies and Antacids.—The casein of human milk when it enters the infant's stomach divides into small flocculent masses. Cow's milk entering the infant's stomach, without an addition of an alkali or other influencing medium, is precipitated

by the pepsin in the stomach and forms a heavy curd, which consists of paracasein, at which the child's stomach oftentimes rebels, as it fails of digestion or assimilation. The adaptation of the casein of cow's milk to the child's digestive capacity so as to maintain suitable nutrition, is a central point around which the whole subject of infant-feeding revolves. It will be noted in the formulas for cow's-milk feeding for different ages that lime-water is used as a diluent. This is used not simply as a diluent of cow's milk nor to render the milk alkaline, as has frequently been stated; it is used to prevent the coagulation of the casein and the resulting formation of tough curds of paracasein. Simple dilution with water may make a smaller curd, but it does not produce the peculiar flocculent character peculiar to human milk that follows the addition of alkalies and antacids to cow's milk. In the presence of an alkali the casein does not combine with the acid in the stomach, consequently the resulting acid coagulation does not take place, hence alkalies and antacids are added to cow's milk.

Recently, Poynton, of London, advocated the use of citrate of soda with a view of preventing the solid coagulation of the casein. It is claimed that by using citrate of soda, one grain to the ounce, sodium paracasein is produced, which is a fluid. Citric acid is liberated and unites with the calcium, forming the citrate of calcium, which is absorbed.

Signs of indigestion of the casein in the milk are usually pain and discomfort. There are usually acute attacks of colic. There may be constipation or diarrhea alternating with constipation, associated with the passage of many hard curds in the stools, the patient losing steadily in weight. In such instances the best means of adaptation consists in reducing the amount of proteid to a total of 1 percent by dilution with water, and the addition of sufficient alkalies, such as lime-water, bicarbonate of soda, or citrate of soda, to form a curd more readily attacked by the digestive juices.

Whey-feeding.—Whey mixtures may be of temporary use in these cases. In whey the casein is largely removed—about 0.3 percent remaining. Analyses of whey show a nutritional equivalent of about:

0.5 percent fat;
0.9 percent lactalbumin;
0.3 percent casein;
4.5 percent sugar.

As whey is ordinarily made, it is impossible to obtain a lower percentage of casein than 0.25. The amount of casein will oftentimes reach 0.5 percent unless it is heated and strained a second time. The deficiency in fat may be overcome by adding gravity cream (page 111) of the same age as the milk from which the whey is obtained, in the proportion of one or two ounces to a pint

of whey. This, of course, carries with it a very small amount of casein, which may make a total beyond the child's digestive capacity. Low proteid must be given only during acute illness or in those digestively ill, and should be a diet for temporary purposes until the child is able to care for a more suitable nourishment. My best results with the whey-proteid feeding have been in my laboratory cases. During the past winter I fed nineteen infants in this way on the Walker-Gordon milk, the casein being given at a minimum at first—0.3 percent with 0.9 percent lactalbumin. Later it was gradually increased as the child showed that he could assimilate it.

Adaptation by the Use of Cereal Gruels.—It is claimed by many excellent observers that the use of cereal gruels causes a mechanical division of the casein, and it is thus more readily acted upon by the digestive juices. While I use gruels as milk diluents largely, and frequently as milk substitutes, I have yet to be convinced that in difficult feeding cases they possess any great value in the adaptation of *casein* to the child's digestive capacity. They are valuable adjuncts to the diet in cases in which weak-milk foods must be given, but I do not recall a case, nor can I find one among my records, where I thought the use of a stronger casein possible because of the cereal water diluent. Repeated trials with gruels, in delicate or in marasmic infants, who afford the crucial tests in any milk adaptation, have never enabled me to give a stronger *milk* proteid because of their presence. Having fed gruels as diluents in a large number of cases for years, I have had abundant opportunity to see enormous curds vomited and passed by the rectum by children on a milk and gruel diet in spite of test-tube demonstrations of the minute division of the curd when the milk was treated with gruels. In making these test-tube demonstrations the process of curdling which takes place in the stomach is followed. The advantage of a cereal diluent lies in the fact that a greater amount of food is given.

The following figures will give an idea of the increase in proteids and carbohydrates occasioned by the use of gruels made from Cereo Co's. barley and oat gruel flours (1 oz. or 4 level tablespoonfuls to the quart of gruel). The amount of proteids in these flours is higher than in the other flours on the market.

	PROTEIDS		CARBOHYDRATES	
Proportion of Milk in Mixture	Water Diluent	Gruel Diluent	Water Diluent	Gruel Diluent
one-eighth	0.40 percent	0.82 percent	0.60 percent	2.7 percent
one-quarter	0.80 percent	1.16 percent	1.20 percent	3.0 percent
three-eighths	1.20 percent	1.50 percent	1.80 percent	3.6 percent
one-half	1.60 percent	1.80 percent	2.50 percent	3.7 percent
five-eighths	2.00 percent	2.02 percent	3.00 percent	4.0 percent

In adding sugar to mixtures made with these gruel diluents, use but about one-half as much as when water diluent is employed.

Adaptation through Peptonization.—When a child has a casein incapacity to such a degree that he is not able to take cow's milk when properly diluted and given at suitable intervals, the peptonization of milk (page 119) may aid us, although I have frequently been sorely disappointed in its use. Theoretically, peptonization—the predigestion of the food—should be a solution of many digestive problems. Its efficiency in actual use can be learned from mortality statistics of children under two years of age in large cities, an immense proportion of the deaths being due to nutritional errors either primarily or secondarily. Not every infant, of course, is given peptonized milk; but if it possessed the value claimed for it by some of its advocates, the demand would be such as to compel its universal use and difficult feeding cases would be no more.

Perhaps I treat five or six cases of casein indigestion a year in which peptonization is unquestionably valuable. In using peptonized milk the proteid strength should be reduced to 1 percent—the lowest point compatible with safety. The amount and intervals of feeding should correspond with those suggested for the age of the patient. I have found the following method the best: Fifteen minutes before nursing the bottle is removed from the ice and from one-eighth to one-fourth of a tube (Fairchild's peptonizing tube), depending upon the amount of milk in the bottle, is added. The bottle is then placed in water sufficiently heated, 110° to 120° F., to make it the right temperature for a child at the end of ten minutes. The degree of the temperature of the water must of necessity vary according to the temperature in the bottle and the amount to be heated.

Malt-soup Feeding.—The use of Loefflund's malt-soup extract (a preparation of malt and potassium carbonate), Kellar's formulas, offers a most satisfactory method of making cow's milk casein assimilable. It is not well borne in vomiting cases nor in which there is a tendency to looseness of the bowels. When either of these conditions exist skimmed milk may be temporarily substituted.

In following this method of feeding the milk strength considered suitable for the condition and age of the child may be used. Lime-water is not employed because of the presence of carbonate of potash in the malt. The malt and the flour, a considerable portion of the latter having been dextrinized, take the place of milk or cane-sugar in the food mixture.

Its chief use is in malnutrition cases, in slow-growing infants, who though not actually ill, fail to show a satisfactory growth on any food given. Time and again I have seen these children show surprising increase in weight without change in the milk strength when the malt-soup with its wheat flour accompaniment was used. In bottle-fed infants who suffer from colic and marked constipation due to casein incapacity it has a considerable field of usefulness.

Malt-soup extract is not to be used in the strength as indicated on the bottle, as the amount is entirely too high. I have found the following method the most satisfactory: For a thirty-ounce mixture, dissolve one ounce of the malt extract in the amount of water used. Mix and blend from one to two ounces of flour by measure with the milk, cream, or top-milk required. If there is abdominal distention and flatulence or other evidences of carbohydrate incapacity, the amount of flour should be reduced perhaps one-half. This is to be strained and added to the solution of malt and water. It should then be placed over a slow fire and "simmered" for thirty minutes, with constant stirring.

In the event of constipation continuing, the amount of malt used may be doubled. Excess of malt, however, may produce vomiting, so that an increase should be made with caution.

The Calorimetric Standard.—The calorimetric standard in its relation to infant feeding was not included in my first edition because I desired this to be a practical work without fanciful theories. Numerous writers claim that the use of the caloric standard has been of value to them, and its omission from the first edition has been noticed by different reviewers.

In brief, the calorimetric standard is based upon the amount of energy indicated in calories for each pound of body weight. A calorie is the amount of heat required to raise the temperature of one liter of water 1° C.

Heubner, of Berlin, several years ago began the employment of calorimetric principles in infant feeding. His original observations were made on healthy breast-fed infants, weighing them before and after each feeding. His observations showed that under six months, one hundred calories were required daily for every kilogram of body weight. After the sixth month, the calories required gradually lessened, so that at the completion of one year about eighty-five calories to each kilogram of body weight appeared to be necessary.

Lamb[1] has reduced Heubner's figures to pounds. He gives the calorimetric requirements as forty-five calories daily per pound of body weight during the first three months of life. During the next three months from forty to forty-five calories daily per pound, decreasing gradually during the next six months, so that at the twelfth month from thirty-two to thirty-five calories daily per pound of body weight would be necessary.

Heubner's observations upon which the standard is based as mentioned above was made on thriving breast babies. In order to judge of its practical value in artificial feeding the histories of thirty-three bottle-fed infants were selected at random from my files for investigation. It was found that every child was getting more food in caloric value than the standard called for. All but two required

[1] Archives of Pediatrics, June, 1908.

food in caloric value exceeding 100, as set by the standard. In thirty-one the daily consumption of these splendidly thriving infants, all of which continued to do well, was from 140 to 360 calories in excess of the Heubner standard. But thirty-three histories were investigated.

I am confident that I have hundreds of records showing the same result. The calorimetric standard is to me a means of no utility in infant feeding. It might aid as a check to excessive feeding in very young and delicate infants. Infants that I see, and they differ not at all from the average infants in this country, cannot be fed by it to the infant's best advantage, and for this reason it was not referred to in the first edition and its use is not advised in this.

CREAM

Market creams are known as "gravity cream" and "centrifugal cream."

Gravity Cream.—Gravity cream is obtained by allowing the milk to stand for a certain length of time and then removing the cream. When milk, as soon as it is drawn, is placed in a quart milk-bottle or fruit-jar and kept at a temperature of between 40° and 50° F., most of the fat will have risen at the end of five hours. When the cream is carefully removed at the end of this time, from 0.3 to 0.8 percent of fat will remain in the milk. The fat content of gravity cream is subject to considerable variation, depending, of course, upon the richness of the milk and the manner in which it is treated, particularly as relates to rapid cooling. In the cream from well-kept grade cows the fat will average about 16 percent. In cream from well-fed Alderney or Jersey herds it may be as high as 20 percent, or higher. In cream from cows indifferently fed, in those who subsist entirely upon poor pasturage, the fat may be as low as 10 or 12 percent. For infant-feeding, gravity cream from the milk of grade cows is preferred. In using cream for infant-feeding all the cream to the milk line should be removed, as the upper layers are much richer in fat than that adjoining the milk. Further, when cream is mixed with milk both must be of the same age, as the addition of older bacteria-laden cream to fresh milk will surely result in grave digestive disorders.

Centrifugal Cream.—Centrifugal cream is that which is removed by an apparatus known as a separator, which consists of a circular bowl for holding the milk so arranged as to make from 3000 to 5000 revolutions a minute. This results in a rapid separation of the lighter fat from the milk. The fat collects near the center of the bowl and is removed by a device arranged for this purpose. The skimmed milk flows outward from another portion of the bowl by a similar device. Centrifugal cream is more difficult of digestion than gravity cream in that the natural emulsion in which the fat is held in the milk is destroyed by the process of centrifuging. Centrifugal

cream may vary greatly in its fat content, depending upon the rapidity of operation of the separator. According to Babcock and Russell, the proteids also undergo a change, which does not add to their nutritive value.

DIFFICULT FEEDING CASES

Under this heading will be considered the acutely difficult cases, those seen in the newly born or during the first month of life. Marasmus and malnutrition will not be referred to here, as these subjects are considered under their respective headings.

Not a few healthy infants for whom the breast-feeding is impossible show intolerance of cow's milk even when it is given very much diluted with lime-water or otherwise. In these infants the intolerance is usually of the casein of the cow's milk. The child suffers from colic, oftentimes to an extreme degree, crying five or six or more hours out of every twenty-four. Generally there is constipation. The stools are usually hard and dry, and when passed, are often composed of broken masses of fecal matter. In some, however, there will be loose watery stools containing many milk curds. The abdomen is usually distended and there may be vomiting, but this is seldom an active symptom. The child remains stationary or loses in weight. If suitable nutrition is not forthcoming, he rapidly develops a condition of malnutrition or marasmus.

Treatment.—*Whey-feeding.*—In some of these infants the feeding of whey (page 107) or cream largely diluted may be successful (page 98). In not a few, however, the small amount, about 0.3 percent, of casein which cannot be removed from the whey is sufficient to cause marked symptoms of indigestion. The addition of citrate of soda, one grain to the ounce (page 107), may be attempted here for the purpose of facilitating the digestion of the casein. A few days' trial may determine whether it will be of any service.

Malt-soup Feeding (page 109).—This method has aided me in solving many difficult feeding problems.

The Wet-nurse.—The use of peptonized milk mixtures is rarely successful with these infants. If the whey or diluted cream or the peptonization of the food or malt-soup feeding is not successful, I invariably advise a wet-nurse if the family can afford the so-called luxury. It is important in the management of one of these cases for the physician to know when he is beaten. A case should never be experimented with to the point of marasmus and exhaustion before securing a wet-nurse, for by this time the digestion may be so thoroughly deranged that her milk will fail to nourish the child.

Condensed Milk.—When the wet-nurse is impossible, it is not wise to attempt the forcing of fresh cow's milk or cream mixtures. Condensed milk should now be resorted to. The proteid of condensed milk is often very readily assimilated by the most delicate infant and furnishes a valuable means of nutrition in not a few cases until the

infant is able to digest better food. It is to be understood, however, that condensed milk is but a temporary expedient. The infants will take it with comfort, and temporarily will thrive on it, oftentimes when cow's milk in any dilution or process of adaptation is impossible. When beginning the use of condensed milk it is best to begin with small quantities—not more than one dram in the boiled water diluent of two or three ounces. In some cases, at first, even one-half dram answers better. Later the strength may be increased to from two to four drams if it is found to agree, the amount depending somewhat upon the age of the patient. When the condensed milk is found to agree, in order to give as much nourishment as possible, No. 1 barley-water or Granum-water (page 130) may be used as a diluent.

Cow's Milk.—When the child has remained comfortable for three or four weeks on some such scheme of feeding, with or without a gain in weight, one feeding daily of a cow's-milk mixture may replace a feeding of condensed milk. A cow's-milk mixture should always be given of a weaker strength than the child's age calls for. In spite of the dilution it may occasion indigestion, colic, and the passage of curds. In such an event the condensed milk and its diluent must again be the sole diet for two or three weeks, when the use of cow's milk may again be attempted. In case this one feeding of cow's milk is taken without inconvenience, a second feeding may replace another condensed-milk feeding in a few days or a week. In this way the number of cow's-milk feedings may gradually be increased until the child is taking a rational diet of cow's milk alone. I have a most difficult feeding case under my care at the present time. A six-months-old baby is taking daily three feedings of condensed milk and three of cow's milk. Attempts have been made to give him the fourth feeding of cow's milk, but invariably with disastrous results. He is slightly under weight, but is in a fair general condition.

I have successfully managed a great many of these difficult feeding infants as described above, the cow's-milk feeding not being commenced until the condensed milk is well taken and the child gaining, when the cow's-milk feeding is gradually advanced so that when the child is three months old it will be taking daily and assimilating two or three feedings of cow's milk; when six months old and sometimes earlier, he will be on entire cow's-milk feedings suitable for his age. I have found that by the above method the desired end of complete cow's-milk feeding is reached sooner than when small quantities of cow's milk are added to the condensed-milk mixture.

In beginning cow's milk it is best to give it at the first or second feeding in the morning, when the digestive powers are stronger than they are later in the day. When the second cow's-milk feeding is given it should never immediately follow the first. The cow's milk and the condensed milk should be alternated until more than one-half of the daily feedings are of cow's milk.

Idiosyncrasies as to Cow's Milk.—In rare instances, cases are encountered in which there exists an intolerance of cow's milk or any form of food which contains cow's milk, including condensed milk, and all the malted foods containing desiccated cow's milk. In such cases the use of any of these substances as foods produces illness of such an alarming type as to necessitate its prompt discontinuance. The only hope for infants thus constituted is a wet-nurse.

Illustrative Cases.—The best illustration of milk idiosyncrasy that I have observed occurred in my own family. A healthy full-term female infant whose birth-weight was seven pounds twelve ounces was nursed by her mother with indifferent success for two weeks, when the supply failed absolutely. Feeding with a most carefully prepared modified cow's milk was begun. The child refused the food and two drams were forced. This was followed, in a few moments, by vomiting and retching, which continued at intervals for twenty-four hours, with collapse and exhaustion to an extreme degree. A wet-nurse was secured, the breast was well taken, and the milk agreed perfectly. In three days the wet-nurse's milk began to fail and was entirely lost in twenty-four hours. A weak dilution of condensed milk was then given, with results almost as disastrous as before. The child at this time weighed six pounds four ounces and showed all the symptoms of early marasmus. A second wet-nurse was secured, whose milk also failed in a few days. Before dismissing her, however, a third was engaged, on whose milk the child thrived most satisfactorily. When three months of age a weak cow's-milk mixture prepared by the Walker-Gordon Laboratory was given. The child refused it, and one-half ounce was forced. As on the previous occasion, vomiting with prostration bordering on collapse was the outcome. The child vomited at frequent intervals for twelve hours and the breast was refused for twelve hours longer. The giving of cow's milk was not again attempted until the child was nine months old, a wet-nurse being employed. She was then strong and vigorous and weighed eighteen pounds. Two drams of a cow's-milk mixture suitable for a child three months of age were given. It produced nausea and vomiting as though an equal quantity of syrup of ipecac had been given, but without any more serious disturbance. At this time the wet-nurse's milk began to fail. The breast-milk nutrition was assisted by the use of a cereal made into a thick gruel. Oatmeal in the form of a gruel to which sugar was added was given, largely because of its high-proteid content. Beef-juice, scraped beef, and pure cod-liver oil were also begun about this time. When one year of age a portion of a soft egg was added to the diet. Zwieback and bread crusts soaked in sugar-water were also used. These solid substances were given two or three times a day, after which the child was nursed. Pure cod-liver oil was almost continuously given during the second year. Butter fat

could be taken without inconvenience when she was one year of age. Following out the above lines of treatment, the child was weaned when thirteen months of age. She has since been fed with an entire absence of cow's milk from the diet. She is now six years of age. Her weight is fifty-five pounds, height forty-eight inches. She is normal in every respect, but six ounces of milk given at one time will produce a coated tongue, foul breath, constipation, and excessive irritability, which is entirely foreign to her nature.

I had a similar experience in the case of a patient—a boy now four years of age who has never been able to take cow's milk. He also is above the average in weight, height, and vitality. I have had a number of these cases which could not take milk up to the eighteenth month or second year. I have had, in all, five cases that could not tolerate milk in any appreciable amount until after the fifth year was passed.

STERILIZATION AND PASTEURIZATION OF MILK

The sterilization and pasteurization of milk, as the terms imply, are for purposes of preservation. By *sterilized milk* we understand milk that is heated to the boiling-point and maintained at that temperature, 212° F., for twenty minutes. The effect of sterilization is the destruction of the pathogenic bacteria, but it will not destroy the spores. Dr. R. G. Freeman's most recent observations show that heating the milk to 140° F. and maintaining it at this point for one hour is of advantage, in that the bactericidal effects are as good as when a higher temperature is used. At the same time the lower temperature produces less chemical change in the milk. *Pasteurization* consists in heating the milk to 167° F., maintaining it at that temperature for thirty minutes, and then quickly cooling it. The effect of sterilization and the rapid cooling is to kill the existing bacteria, thus preventing, temporarily, further bacterial growth in the milk. The heating of milk to this high degree of temperature—212° F. (the boiling-point)—produces certain changes in the milk. The lactalbumin is coagulated, the lime salts are rendered insoluble, and the casein is rendered much more difficult of digestion, so that the heating of milk in this way renders it more difficult of digestion and lessens its nutritive value.

Results of Sterilization.—Constipation is one of the unfavorable results of sterilizing milk. The peculiar taste produced by boiling is another of the disagreeable features connected with it. The cooking of the milk destroys certain of its nutritional properties but little understood, the result of which may be scurvy, rachitis, or some other form of malnutrition. Sterilization, however, is in certain conditions necessary. The milk which is boiled in a bottle which is properly covered is "sterilized milk," but if the sterilization is to be carried on day after day an Arnold sterilizer (Fig. 14) should be used. For purposes of pasteurization the Freeman pasteurizer (Fig. 15) is recom-

mended. Pasteurization makes less change in the character of the milk content; consequently there is less interference with its nutritive value. The temperature, too, 167° F., is sufficiently high to destroy pathogenic bacteria, including the Bacterium lactis and the Bacterium aërogenes, and hence acts as a valuable preservative, particularly during hot weather. But heating the milk to this degree exerts little influence in causing constipation, nor does it change the taste of the milk.

Pasteurization Safest for Exclusive Use.—As to the feeding of milk, whether it shall be given sterilized, pasteurized, or raw, endless discussion has arisen in the press and in medical societies. Each method has its advocates. Among the pediatrists at the present time, some contend that milk should be sterilized, regardless of the season of the year, the character of the milk, or the station in life of the patient; others maintain that invariably it should be given raw, regardless of the above-mentioned conditions; while still others are devoted to pasteurization. If any of the methods were to be used exclusively, pasteurization, being the safest, should be selected. Judging from my own experience in the matter of the heating of milk for infant foods, the subject should be considered from a broad standpoint. There is no one way of heating milk that is invariably the best way. According to my observation, which covers every class of society, there are several factors which determine which is the proper procedure in a given case.

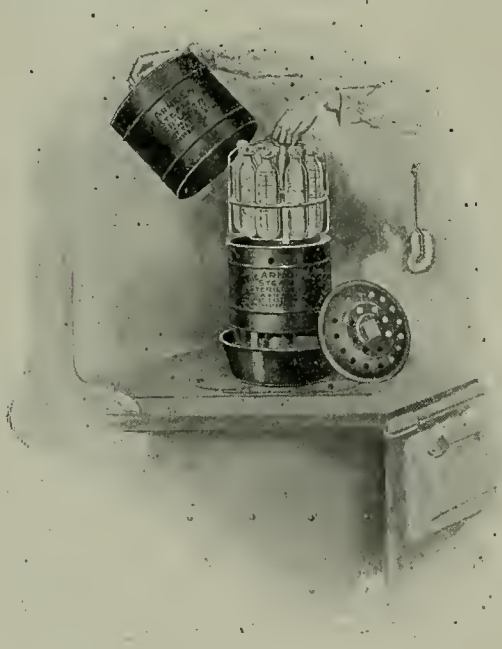


FIG. 14.—ARNOLD STERILIZER.

Raw Milk Preferred if Fresh and Pure.—There is no doubt whatever that the less the milk is heated, the better food it is for the baby, assuming that it is clean when procured and can be kept clean and sweet until it is used. (See Cow's Milk, page 83.) This is possible in some of our dairies of the better class; it is possible with many who live in the country, or who go to the country for the summer and who keep their own cows or who get their milk-supply from a neighboring source which they can control. Under such conditions the milk may be given raw during the entire year.

When the milk has to be shipped a considerable distance during the summer, when its safety depends upon the industry and care of the employees of a milk farm, I find it advisable to pasteurize the

milk during the heated term; therefore the majority of my private feeding cases get raw milk during eight months of the year and pasteurized milk four months. Sterilized milk is never used among these patients except when preparing for an ocean voyage (see Milk for Traveling, page 122) or for a long-distance journey by land. Among out-patients, after feeding many thousands of them I find the following scheme the safest: From May 1st until October 1st, the milk is boiled (sterilized). These people, most of them, cannot afford a pasteurizer or sterilizer or understand the use of either. From October 1st to May 1st, the milk is given raw. Pasteurization would be preferable, but it is possible with but very few dispensary patients. Even the giving of

FIG. 15.—FREEMAN PASTEURIZER.

cooked milk, which unquestionably often becomes infected after cooking, is attended with no little risk to the child, as is shown by the death records of bottle babies during the summer. The giving of the cheap market milk raw to infants of the tenements during the heated term in any large city can only help to increase the terrible mortality of this season.

The object of heating the milk should always be explained to the mother so that she may appreciate the necessity of keeping it carefully covered and properly caring for it afterward. The idea is prevalent among uninformed people that after sterilization but little further protection is required. When I am satisfied the out-patients have not the intelligence nor the requirements for keeping

cow's milk during the summer, such as an ice-box and ice, I discontinue the ordinary milk-feeding for the hot months and use condensed milk instead (page 105).

CONDENSED MILK

Condensed milk is in the market in three forms—fresh condensed milk sold in bulk, condensed milk sold in hermetically sealed cans, and evaporated cream, sold also in hermetically sealed cans. The evaporated cream usually contains no more fat than does condensed milk; in fact, it is condensed milk without the addition of sugar, which acts as a preservative. They are put up in small cans and soon become putrid after opening. Therefore the contents of a can should be used only on the day it is opened. Of the condensed milk, I prefer the sweetened variety, of which there are many kinds showing slight variation in the analysis. The Eagle Brand of Borden is that which I usually employ, an analysis[1] of which showed it to contain:

Fat	8.8 percent
Sugar	52.2 "
Total proteid	9.3 "
Total solids	72.2 "
Ash	1.9 "
Water	27.8 "

The following combinations of condensed milk with barley-water may be found useful in the various ages indicated:

Under three months of age: Condensed milk, one-half to one even teaspoonful; barley-water, two to four ounces.

Third to sixth month: Condensed milk, one to two even teaspoonfuls; barley-water, four to six ounces.

Sixth to ninth month: Condensed milk, two to three even teaspoonfuls; barley-water, six to eight ounces.

Ninth to twelfth month: Condensed milk, three even teaspoonfuls; barley-water, eight ounces.

It will be seen that when condensed milk is diluted from ten to twenty times, we have a food weak in fat and weak in proteid. It should never be selected as a permanent diet unless poverty necessitates it or unless it is the only milk food the patient can digest. For temporary purposes it is often useful, as is shown in different portions of this book (see index). Where cow's milk cannot be used in a given case, and condensed milk must be continued, it should be fortified with a cereal gruel of barley or oatmeal; pure cod-liver oil should also be given to make up for the deficiency in fat in the food.

[1]Analysis made for the author by Dr. Frederick Sondern, of New York.

PEPTONIZED MILK

Milk is peptonized, or predigested, for the purpose of partially or completely digesting the proteid before it is given to the patient. As a means of assistance in making a milk food assimilable its field of usefulness is limited. The process referred to (page 109) has been the one most successful with me. So-called complete peptonization produces a product with a decidedly bitter taste, and but few children will take it. Peptonized milk, however, has other uses than as a means of daily feeding. Peptonized milk in which there is a complete conversion of the casein has been most useful in two types of cases.

For Gavage.—During acute or chronic illness when a child cannot take food by the natural method, as in diphtheritic paralysis, or when he will not swallow on account of an acute inflammatory disease of the throat such as peritonsillitis, retropharyngeal abscess, or retropharyngeal adenitis, or when he is in a comatose condition from any cause except intestinal infection, the feeding of completely peptonized milk by gavage (page 140) is of inestimable value. In such conditions, as a valuable aid in nutrition, frequent reference is made to it throughout this book.

For Nutrient Enema.—In conditions when stomach-feeding is impossible either by gavage or the natural method—conditions met with in persistent vomiting due to acute cerebral diseases, in recurrent vomiting, in acute gastric indigestion—and as an accessory means of feeding when sufficient nourishment cannot be taken by the stomach, the colon-feeding of completely peptonized skimmed milk has a decided field of usefulness, and in this way I often employ it. Feeding by means of the bowel, however, is usually possible in children for a few days only, because of the local irritation produced by the nutriment and by the passage of the tube. Skimmed milk, peptonized, with the addition of the white of egg makes the best nutrient enema that I have used (page 145). It should be given at a temperature between 90° and 95° F. at from six to eight-hour intervals. The tube should be introduced at least nine inches. In cases of recurrent vomiting I have repeatedly seen both hunger and thirst relieved by feeding in this way. The following are the different methods for the peptonization of milk.

Peptonization.—*Immediate Process.*—Fifteen minutes before feeding add from one-eighth to one-quarter of the contents of a Fairchild peptonizing tube to the milk mixture which is in the nursing-bottle ready for use. Place the bottle in water at a temperature of from 110° to 120° F., and let it remain until fifteen minutes have elapsed. The amount of the powder used and the degree of heat of the water depend, of course, upon the amount of milk in the nursing-bottle.

Cold Process.—Put four ounces of cold water into a clean quart

bottle and dissolve in it, by shaking thoroughly, the powder contained in one of the Fairchild peptonizing tubes; add a pint of cold fresh milk, shake the bottle again, and immediately place it upon ice—directly in contact with it.

The bottle should always be well shaken before and after pouring out a portion of its contents.

Partially Peptonized Milk.—Put four ounces of cold water and the powder contained in one of the Fairchild peptonizing tubes into a clean saucepan, and stir well; add a pint of cold fresh milk and heat with constant stirring to the boiling-point. The heat should be so applied that the milk will come to a boil in ten minutes. Let it cool until lukewarm, then strain into a clean bottle or glass jar, cork tightly and keep in a cold place. The bottle or jar should always be well shaken before and after pouring out a portion.

Partially peptonized milk, if properly prepared, will not become bitter.

Completely Peptonized Milk.—Put four ounces of cold water and the powder contained in one of the Fairchild peptonizing tubes into a clean quart bottle and shake thoroughly; add a pint of cold fresh milk and shake again; then place the bottle in a pail or kettle of warm water—about 115° F., or not too hot to immerse the hand in it without discomfort. Keep the bottle in the water-bath for thirty minutes. Put it immediately upon ice—directly in contact with it.

THE FEEDING OF BUTTERMILK, SOUR MILK, FERMENTED MILK

A great deal of literature has appeared during the past few years relating to the use of different forms of soured milk for infant feeding. Buttermilk has been used for this purpose in Holland for a great many years. Various Continental and American observers report having used it extensively and with gratifying results.

During the summer of 1906 the use of buttermilk as a means of infant feeding was begun at the Babies' Hospital by Dr. L. Emmett Holt, and continued during the summer service by Dr. L. E. Le Fetra and myself. Our results at that time with a considerable number of cases were not satisfactory and its use was discontinued. It was thought that a possible cause of lack of favorable results might rest with the buttermilk, that it was not as good as used by others, although every care was used and no expense spared to secure the best.

During the summer of 1908 the feeding of artificially soured milk, using tablets containing a pure strain of the lactic acid bacillus, was again attempted along somewhat different lines. The milk was prepared in the diet kitchen of the hospital, using the tablets in question, prepared by dissolving a tablet in four ounces of water. This was mixed with one quart of milk and allowed to stand at room-temperature from twenty-four to forty-eight hours, when a

delicious full fat fermented milk was produced. This was diluted with water or cereal water, with the addition of milk or cane-sugar, to bring the carbohydrate to proper proportions, the dilution of the milk depending upon the age and the assumed digestive capacity of the patient.

The child's caloric requirements were considered in each patient. It was used in thirty-four cases, full milk being employed in thirty cases, skimmed milk in four cases. Two groups of children were treated. The first group, fifteen in number, were distinctly feeding cases, and came to the hospital because they were not thriving. They varied in age from one to sixteen months. Twelve were less than six months of age. In eleven of these fifteen, full milk was used. In the remaining four, milk had been skimmed. In the eleven in which the soured full milk was used, every child but one lost, and this gained but one-half ounce in two weeks. Two babies were on the food two days, one practically refusing it, the other making a loss of four ounces in the two days. Five were given the milk from three to six days. Among these, the greatest loss was nine ounces, the smallest, one and one-half ounces. One child in fair condition lost six ounces in three days without a sign of illness and took the food well. The four that were given the soured skimmed milk fared as badly. One only gained one and one-half ounce in ten days and made a prompt gain when other food was used. The other three failed rapidly and died from inanition, two after four days, the other after nine days.

The results were so disastrous that the observation on the feeding cases was discontinued at this point. The children were not made ill by the soured milk. They simply faded away under its use.

In a large experience in hospital and private work, I have never seen as typical a clinical picture of depression, prostration, and pallor as shown by these soured milk-fed babies.

The second group comprised infants who were given the soured milk after intestinal disease. It is most difficult, as is well known, after a severe attack of summer diarrhea to bring the child to a thriving cow's milk diet. It was thought that this condition of protracted convalescence could be shortened in the use of the soured milk. It was thus used in nineteen cases. Its use was begun after the subsidence of the acute symptoms, when freer feeding might safely be instituted. The patients ranged in age from one month to fourteen months. Nine were over six months, of which number, two were over one year. The youngest was one month old. The milk was used as in group one. The duration of its use was from one to sixteen days. The milk was refused absolutely by two. Four were given the food from two to four days. The early discontinuation of the food was the result of its refusal by two, and by very rapid loss in weight in the others. But four gained in weight.

One gained 7 ounces in sixteen days
One gained 2 ounces in sixteen days
One gained 10 ounces in fifteen days
One gained 1 ounce in six days
One remained stationary for twelve days
One lost 2 ounces in ten days
One lost 12 ounces in eleven days
One lost 24 ounces in nine days
One lost 12 ounces in twelve days
One lost 8 ounces in eight days
One lost 7 ounces in seven days
The other lost, but smaller amounts.

It will be seen that but two in this series made a satisfactory showing. By our usual methods of resuming stronger feeding with diluted milk or with condensed milk, the results are incomparably better. It would hardly seem necessary to add that we do not advise treatment of milk with the lactic acid bacillus for purposes of infant feeding. These results were so far inferior to those following our usual methods of treatment that all observations were discontinued at this point.

MILK FOR TRAVELING

In making long journeys with infants by land or water, the feeding of the child is an important matter, and advice is often sought by mothers who wish to make the contemplated trip with the least possible risk. It is, of course, desirable that no change be made in the milk commonly used, and there are means of treating the milk and of keeping it which enable us to assure the patient of reasonable safety. It is my custom with city children to have the milk prepared at the Walker-Gordon Laboratory, where at a trifling expense small ice-boxes can be obtained which contain sufficient space for a few days' supply of milk and which can be conveniently carried on cars and boats. They have also larger boxes with a capacity of twelve quarts which may be used for an ocean voyage. The smaller box will need refilling with ice, once or twice a day, which is usually readily secured. The larger box for ocean voyages is packed in ice and placed in a cold-storage room of the vessel and will not need repacking during the trip. The milk prepared for a journey should be cooled to 45° F. as soon as it is drawn, and kept at this temperature until it can be sterilized at a temperature of 212° F. for twenty minutes. It then should be cooled rapidly to at least 50° F. and kept at this point until used. These directions can be carried out by any intelligent family. When this is done the milk will be safe for use for the time required—from seven to eight days. Of course, laboratory milk is available for comparatively few. But the suggestion as to the making of an ice-box can be followed in any town or village, so that a milk laboratory is not essential. All that is required is the ice-box, the quart fruit jars or quart milk bottles, and clean milk. Those who for any reason

cannot avail themselves of the milk thus preserved will find in canned condensed milk a fairly good substitute. If kept on ice and wrapped in a sterile towel, a can of condensed milk may safely be used for three days after opening. Formulas suited for the various months of infancy will be found in the section on Condensed Milk (page 118).

THE PROPRIETARY FOODS

The foods on the market prepared for purposes of infant-feeding are very numerous. From our knowledge of the composition of mother's milk we learn what nutritional elements and approximately in what relative proportions these elements must exist in order to supply the child with the food which nature intended him to have. The examination of the milk of thousands of nursing women shows that it ranges from 2.5 to 4 percent fat, 6 to 7 percent sugar, and 1 to 1.5 percent proteid. These figures may be put down as the normal limits of human milk, and they are so, simply because the infant will thrive and grow when the nutritional elements in approximately the above proportions are supplied to him. It is within these limits that the food must be kept in order that there may be normal growth and development; though, of course, wide variations from these may be of temporary occurrence. While the child may exist and temporarily do fairly well on a percentage of fat lower than 2.5, he will invariably show defective growth if the proteid remains persistently under 1 percent. The chief disadvantage in the infant foods which are used without the addition of cow's milk, lies in the fact that they do not contain the nutritional elements as they exist in normal breast-milk, and besides, of necessity, they are all cooked foods.

In selecting a substitute for mother's milk (page 82) one point is to be kept in mind, viz., the substitute should contain, in a readily assimilable form, the nutritional elements in approximately the proportions and forms in which they exist in mother's milk. All other feeding is defective. It is not well to put too much reliance on the analysis sometimes published by the proprietary food manufacturer. This type of food is decidedly weak in animal fat, for the reason that there is no means of keeping more than a small percentage of it in a food without its becoming rancid. When considerable percentages are indicated in the analysis it is certain that it does not consist of butter fat. The quantity of animal milk proteid is likewise deficient, and what is present has been cooked, thus detracting materially from its value in infant nutrition. Scurvy is not an infrequent result of the exclusive use of these foods.

The Uses of Proprietary Dried-milk Foods.—It is to be remembered that this type of food is condemned because of its being an unsuitable food when used exclusively and persistently. Hysterical general condemnation of the proprietary infant foods is an injustice. Throughout this book, the proprietary foods will be found mentioned

from time to time and their uses dwelt upon. In constipation in "runabout" and older children who are on a general diet, the importance of milk in the nutrition is a secondary one, and is often an important factor in the production of constipation. In these cases cow's milk may be replaced by one of the proprietary dried-milk foods which has a laxative effect, with a good deal of advantage. I sometimes employ them further in other disordered states. During acute illness and in convalescence from illness and in certain forms of malnutrition they are usually readily digested and may help us over difficult places.

Proprietary Foods to Which Fresh Cow's Milk is Added.—These are not foods in the usual acceptation of the term, and if they are used alone independent of milk the patient will soon present a sorry spectacle. They are sugars largely, being composed of maltose and dextrose, which are derived from starch. Some contain a considerable quantity of unconverted starch. When added to the water and milk mixtures they furnish the soluble carbohydrates and free starch, and thus fulfil this function in the food with as good results as, but usually no better than, would milk-sugar and a cereal gruel. Maltose is a laxative sugar. In case of constipation in the bottle-fed it may replace the milk-sugar in equal quantity, and as such may be used with decided advantage in some cases. In other cases this change to maltose is without effect. The claim that when added to cow's milk these proprietary foods increase the liability to scurvy is without foundation. If the milk is given uncooked, the child will not have scurvy, regardless of the nature of the carbohydrate; if the milk is heated to 160° or 170° F., the child may have scurvy regardless of the carbohydrates.

The exploiting of photographs of crowing, fat, red-cheeked babies which are used to illustrate the supposed virtues of this or that manufacturer's food composed principally of maltose, is not a very high-minded procedure on the part of the manufacturer who thus stoops to steal the credit which belongs to a cow! According to my observation, the statement that the addition of maltose to cow's milk facilitates its digestion is unfounded. I have tried it in many cases, but have never been able in consequence to use a stronger cow's-milk mixture, a higher proteid. The true test of such a measure is its use in the delicate, and in difficult feeding cases, and not in well babies who thrive regardless of the carbohydrate employed. The maltose preparations, then, in the sense that they may contain a small amount of proteid and a laxative sugar, are useful and to be recommended when such a carbohydrate is needed.

The Proprietary Beef Foods.—Numerous preparations of this nature are on the market and there has been abundant opportunity to test their value. Without going into a lengthy discussion as to how and under what conditions these preparations have been used, it is sufficient to say that as a means of nutrition in children they

play a very unimportant part. Their principal use is in illness, in which they act as a stimulant, and to a less degree as a food. They all make weak proteid mixtures when diluted so that the child can take them. The possibility of supplying any great amount of nutrition to the economy by their use is impossible; occasionally, however, they may be used to advantage. When milk is withdrawn, they may be added to the cereal gruel substitute. If there is diarrhea, great care must be exercised, as the proprietary beef preparations as well as beef-juice may increase it. On account of the creatinin which they contain, they should not be given in any of the forms of nephritis. Another feature which limits their use is that a child soon tires of them. They can rarely be given more than two or three times in twenty-four hours. Valentine's is the preparation I usually select. It may be given in solution—one-quarter to one-half teaspoonful to six ounces of the diluent.

CEREAL GRUELS; STARCH-FEEDING

Much discussion has taken place during the past few years as to the use of cereals in infant-feeding.

The cereals consist of plant embryos surrounded by a mass of highly nutritious proteids and carbohydrates in the form of starch which nourishes the embryonic plant until it becomes rooted in the ground. As the developing plant needs nourishment it converts the starch into dextrin and maltose. Cereals are analogous to eggs in that the germ is packed away in a supply of exceedingly nutritious food which in the process of development it converts into tissue. Almost all of the prepared infant foods are made from cereal flours, with or without the addition of a little dried milk or sugar; or from cereals in which the starch has been transformed into dextrin and maltose. The proprietary meal foods which consist of baked flours of different kinds are useful aids in infant-feeding and most useful as milk substitutes when milk must temporarily be withheld. The conversion of starch into dextrin by the baking process is so slight that it may be ignored. Robinson's barley flour, Cereo Co.'s barley flour and the other gruel flours, and Imperial Granum (baked wheat flour) require boiling before use. They may be prepared according to the instructions given in the formulary (page 129).

It is my custom in bottle-feeding to begin with a cereal from the fifth to the seventh month, by using a cereal water *as a diluent of the milk mixture*. For this purpose barley or granum is usually employed. Very often in out-patient work I begin with a cereal diluent very early in life in order *to make the food mixture more nutritious*. This method of feeding is useful when accurate modifications are not possible and when the child for any reason cannot take a milk formula as strong as its age and nutritional requirements demand. Such cases are frequently seen in the marasmic, the malnutrition, and the difficult feeding class. The addition of

two or three tablespoonfuls of flour to the daily food will increase its nutritive value not a little. That boiled starch may be digested by the youngest and most marasmic infant has been proved under my own observations.

The principal use of these flours, however, is in the gastro-enteric diseases, where they may with safety replace the milk for considerable periods of time. In the treatment of the acute intestinal diseases their uses are repeatedly referred to. By eliminating milk from the diet and giving carbohydrates, a putrefactive culture-field is removed and a less favorable soil is furnished for the development of the intestinal bacteria; further, there are no by-products formed to produce intestinal toxemia or kidney irritation. Two even tablespoonfuls of these flours to one pint of water give approximately a food strength of 0.07 percent fat, 0.3 percent proteid, 2 percent carbohydrate. In order to increase the nutritive value, cane-sugar may be added in sufficient quantity to bring the carbohydrate percentage up to five. The addition of the sugar also makes the cereal more palatable, and it will therefore be taken more readily by the patient.

During an invasion of scarlet fever, pneumonia, or any of the illnesses of childhood which may be accompanied by great prostration, the usual foods, whatever their nature, should be withheld, and the cereal gruel alone or mixed with chicken or mutton broth used as a very satisfactory substitute. Likewise later in the disease it is never well to give full milk while fever and prostration are present. A useful field for the cereal gruels is as diluents of the milk in conditions where this combination must often furnish the nutrition for days. The use of the baked-flour gruels, with sugar or without, as a means of nutrition should be continued only during the active symptoms of the disease, whether it is scarlet fever or one of the intestinal diseases. In no sense are these gruels advocated as exclusive foods for infants or for growing children. I have seen many cases where this error has been made with most disastrous results.

The Infant's Capacity for Starch Digestion Proved by Experiment.—It has been claimed with more or less tenacity by different writers that the young infant possesses no capacity for starch digestion. Two years ago a study of starch digestion in infants of different ages was undertaken at my suggestion at the New York Infant Asylum. In the first series of sixty cases, 324 stool examinations were made, for purposes of observation on exclusively starch-fed children.

Boiled barley flour in the form of a gruel in amounts of from 142 to 1560 grains in twenty-four hours was given, the usual quantity being from 400 to 500 grains. In testing for starch in the stools, the von Jaksch iodin method was employed. In thirty-three cases the stools were persistently negative, five examinations having been made on five successive days; of these, eleven were under six months of age. One, who was nineteen days old, took 142 grains of starch

daily, and the stools were negative to the two examinations made on two successive days. One, twenty-one days old, took 225 grains every twenty-four hours. To one, five months and twenty-six days old, 375 grains daily were given. In each of these cases five examinations were made, all being negative. To one five and a half months of age 450 grains were given for three successive days. It was then decided to increase the starch and test his digestive capacity. There were accordingly given him 1560 grains daily for two days. The stools failed to respond to the iodin test. One was one month and twenty-two days old. The patient was thin and he had diarrhea. Four hundred grains were given the first day, followed by a negative stool. Three hundred and ninety grains were given on each of four successive days, the stools remaining negative. To another child, one month and nineteen days old, 185 grains were given for three days, with stools negative. The starch was then increased to 300 grains for two days, the stools still remaining negative. In seven cases the stools were persistently positive, showing the presence of starch in considerable amount at each examination. In twenty cases the reactions were sometimes positive and sometimes negative. From these examinations it was shown that of the sixty cases in question, forty-one showed a good starch capacity and nineteen an indifferent or poor starch capacity. That some of the starch may have undergone fermentation in the intestine is, of course, possible. However, it could not have been a factor of great consequence, for the patients did not show more than the usual bowel distention. Dextrin was present at times in over one-half the cases, thus showing only a partial conversion from the presence of a starch enzyme. In all these children subjected to the test, a fair degree of nutrition was maintained during the period of the exclusive starch diet. Several of the starch-fed infants in which the stools were negative to iodin were very young and very delicate. This led us to undertake a study of the stools of infants fed exclusively on the breast, with a view of determining, if possible, the presence of starch-digesting enzyme or enzymes in the feces, 161 tests being made of the stools of twenty-six children. The ages were: under two weeks, twenty-two; between one and two months, three; one, the oldest child, was two and one-half months old. The tests were conducted as follows: A solution of starch, 1:500, was boiled for fifteen minutes. From one to four drams of this solution were then put into a test-tube, and to this a dilute Lugol solution was added and the tube marked for control. To another boiled solution of starch of similar strength, Fehling's solution was added to determine the presence of sugar, which, of course, was absent. In another tube a portion of feces in plain boiled water was tested for sugar and always found negative. The observations were thus protected by three controls. In still another tube an equal amount of a 1 : 500 starch solution was boiled for fifteen minutes and a definite amount of feces by weight was

added. The contents were then thoroughly shaken and placed in a water-bath, which was maintained at a temperature of 100° F. for one-half hour. The solution was then tested for sugar with Fehling's solution. In every case the presence of sugar was indicated, thus proving the presence of something in the feces which transformed the starch into maltose. The observations agree with those of von Jaksch, who proved a starch-converting ferment in twenty-eight out of thirty cases, and with those of Moro, who proved the same thing in thirty-eight out of forty cases.

It was found that the converting capacity of the feces for starch was in the proportion of one grain of feces to about one-twentieth grain of starch, this amount being required for the complete conversion of the starch into sugar. In one case there was a capacity of but one-sixtieth grain of starch to one grain of feces. In three, one grain of feces converted one-tenth grain of starch. When stronger starch solutions were used, there was a response both with the Lugol and Fehling solutions, showing a partial conversion. In three, the examinations began on the day of birth and were continued for several days, four examinations being made in each case. Six were commenced on the second day and continued for four days. One premature baby (eight months) which lived six days and weighed four pounds four ounces showed a power of conversion of one grain of feces to one-thirty-second grain of starch.

Excluding bacteria of feces and the ptyalin of the saliva, it would seem that the succus entericus and the pancreatic juice were responsible for the very active diastatic ferment.

Zweifel and Korwin were unable to extract a diastatic enzyme from the pancreas, in infants under three weeks old, and concluded therefore that none existed. Their methods cannot be accepted at the present time as establishing this point, as the glands were macerated and placed in distilled water, in some instances for only one-half hour, and then mixed with a strong starch solution. Moro followed along the lines laid down by Zweifel by using distilled water, though the maceration was continued for a much longer time, and in ten infants under three months of age proved a diastase in the pancreatic extract in seven. In two of these the infants died at birth. One lived fourteen days. Four were between one and three months of age. We now know that much stronger extracts of the pancreas are to be obtained when the organ is cut into small pieces, ground with sand in a mortar, and macerated in a solution of 15 percent alcohol or 40 percent glycerin. Furthermore, it is not logical to compare with a dead organ the active functionating pancreas of a living child under the stimulating influence of food in the intestine. Our own observations as to the elaboration of pancreatic extract and the succus entericus have not been carried far enough to warrant any authoritative statement based on the findings;

but the claim that the diastase is furnished by the mother's milk is negatived to a great extent by the fact that the feces extract from meconium stools was as active before breast-feeding as later.

It will be seen from the foregoing that the majority of infants of tender age are able to digest starch. With not every infant is this possible, and, according to this report, starchy foods thus resemble every other substitute feeding. Not every infant by any means can take cow's milk or asses' milk or goat's milk; but that starchy foods may be added with benefit to infant milk foods in a great majority of the cases, and that they may be used with benefit as a substitute for these foods in illness, is established beyond all question, both experimentally and clinically.

FOOD FORMULAS

Beef-juice.—Take a round steak, cut into pieces the size of a horse-chestnut, place in a buttered pan in a hot oven, and bake for fifteen minutes; remove from the pan and press out the blood; add salt to the taste.

Beef, Mutton, and Chicken Broth.—Take one pound of meat free from fat, cook for three hours in one quart of water, adding water from time to time, so that when the cooking is completed there will be one quart of broth. When the broth is cool, remove the fat, strain, and add salt to the taste.

Scraped Beef.—Broil round steak slightly over a brisk fire. Split the steak and scrape out the pulp, using a dull knife.

Egg-water.—The white of one egg, thoroughly beaten in one pint of cold, boiled water; strain; add salt to the taste.

Oatmeal Jelly.—Oatmeal, four ounces; water, one pint; boil for three hours in a double boiler, water being added, so that when the cooking is completed a thin paste will be formed. This while hot is forced through a colander to remove the coarser particles. When cold, a semisolid mass will be formed.

Wheat Jelly and Barley Jelly.—Wheat jelly and barley jelly are made in the same way as oatmeal jelly, using cracked wheat or barley grains.

Barley-water (No. 1).—Robinson's barley flour or Cereo Co.'s barley flour, one rounded tablespoonful; water, one pint. Boil thirty minutes; strain; add water to make one pint.

In making **Barley-water No. 2,** two tablespoonfuls of the flour are used.

Rice-water (No. 1).—Rice, one tablespoonful; water, one pint; boil three hours, adding water from time to time, so that there is one pint of rice-water at the end of the three hours.

In making **Rice-water No. 2,** two tablespoonfuls of rice are used.

Dextrinized Barley-water.—Robinson's barley flour or Cereo barley flour, three tablespoonfuls; water, one pint; boil thirty minutes; add water to make a pint. When lukewarm (100° F.),

add one teaspoonful of Cereo; strain; this changes the starch into dextrinized maltose.

Oatmeal-water (No. 1).—Oatmeal, one tablespoonful; water, one pint; cook three hours and add water to make one pint.

In making **Oatmeal-water No. 2,** two tablespoonfuls of oatmeal are used.

Imperial Granum-water (No. 1).—Imperial Granum, one tablespoonful; water, one pint; cook thirty minutes and add hot water to make one pint.

In making **Granum-water No. 2,** two tablespoonfuls of Granum are used.

Percentage Gruel Flours.—There has recently been put on the market in tin boxes, the covers of which are used as measures, a series of flours, especially made for preparing cereal gruels and jellies of known percentage composition. On the labels are given only the cooking directions for preparing plain or dextrinized gruels, and their composition when different quantities of flour are used. They are as follows:

APPROXIMATE COMPOSITION OF GRUELS MADE FROM CEREO CO.'S GRUEL FLOURS.

	Barley.		Legume.[1]		Oat.		Wheat.	
	Proteids.	Carbohydrates.	Proteids.	Carbohydrates.	Proteids.	Carbohydrates.	Proteids.	Carbohydrates.
¼ ounce flour to quart of water	0.12%	0.60%	0.19%	0.53%	0.12%	0.60%	0.10%	0.62%
½ ounce flour to quart of water	0.24%	1.20%	0.39%	1.06%	0.24%	1.20%	0.20%	1.25%
¾ ounce flour to quart of water	0.36%	1.80%	0.58%	1.59%	0.36%	1.80%	0.30%	1.88%
1 ounce flour to quart of water	0.48%	2.40%	0.78%	2.12%	0.48%	2.40%	0.40%	2.50%
2 ounces flour to quart of water	0.96%	4.80%	1.56%	4.24%	0.96%	4.80%	0.80%	5.00%
3 ounces flour to quart of water	1.44%	7.20%	2.34%	6.36%	1.44%	7.20%	1.20%	7.50%
4 ounces flour to quart of water	1.99%	9.60%	3.12%	8.40%	1.92%	9.60%	1.60%	10.00%

Whey.—Put one pint of fresh milk into a saucepan and heat it lukewarm, not over 100° F.; then add two (2) teaspoonfuls of Fairchild's essence of pepsin and stir just enough to mix. Let it stand until firmly jellied, then beat with a fork until it is finely divided; strain, and the whey, the liquid part, is ready for use.

Junket.—To one pint of fresh milk add two teaspoonfuls of sugar and one junket tablet or two teaspoonfuls of essence of pepsin. Allow it to stand over a fire until the temperature is 100° F.; then add vanilla as a flavoring and allow it to stand until the curd is set, when it should be placed on ice.

[1] Made from equal parts of peas, beans, and lentils.

HABITUAL LOSS OF APPETITE

The growing child, like the adult, not only requires sufficient nourishment to sustain life, but, in addition to this, an extra amount to supply the demands of growth. Proportionate to their size, therefore, all growing animals require more food than do those that have reached maturity. The young child is naturally such a very hungry animal that ample feeding is absolutely essential. Therefore, when there is a habitual loss of appetite so that the child's entire life may be unfavorably influenced, we must realize the fact that the condition is abnormal and strive to discover the cause and apply the remedy.

Physicians are often consulted by parents whose children are suffering temporarily or persistently from loss of appetite—a condition usually associated with secondary anemia and asthenia. The child apparently is not ill, he may be active and playful, but he tires easily. The sleep ordinarily is sound and refreshing but the child must be coaxed to eat. Oftentimes he will take food only when his attention is diverted by a story or a toy. He usually eats for the entire family, taking a mouthful each for father and mother, for the coachman, and for the cook! Three or four times a day, depending upon the number of meals, this coaxing, entertaining process has to be gone through with. Occasionally in children with habitually poor appetites for food in general there will be a history of excessive milk-drinking. From three to five glasses of milk may be taken daily and all other food refused. When milk forms the principal or only article of nourishment after the eighteenth month, children will invariably show evidences of malnutrition. They are apt to be pale and sallow, with flabby muscles. The most frequent cause of loss or lack of appetite is too frequent feeding. It is not at all uncommon to see children from two to four years of age who are being fed six or seven times in twenty-four hours, the argument of the parents being that: "The child takes so little food, he ought to take it oftener." With increasing age, more and stronger food is required at less frequent intervals. In other cases children may not get their regular feedings at such frequent intervals, but are generously supplied between meals with candy, cake, crackers, and fruits. Unsuitable food may be the cause of a habitually poor appetite. Children of tender age who are regularly fed from the adult table with heavy adult food, oftentimes improperly cooked, soon suffer from loss of appetite. Children who are poor eaters usually have the associated ailment, constipation. Too close confinement indoors is not infrequently associated with, if not a direct cause of, lack of appetite. Children who are kept uninterruptedly in the house for weeks at a time invariably have poor appetites.

Treatment.—In order to emphasize a point in teaching, when treatment is under consideration, I have sometimes found it useful to state,

first, what *not* to do. Do not give these children drugs as a means of inducing an appetite until all other means have failed. The only medication that should be permitted is some simple laxative. There must be one evacuation of the bowels daily. The aromatic fluid extract of cascara sagrada, from one to two drams, given daily at bedtime, or from three to five ounces of the citrate of magnesia given before breakfast, ordinarily answers well.

Fresh Air.—Every "runabout" child should spend at least five hours daily in the open air, regardless of the season of the year. During very inclement weather in winter indoor airing (see page 37) is a most satisfactory substitute.

Diet.—An important step in the treatment is in the regulation of the feeding hours. A child from twelve to fifteen months old requires five feedings daily (see Dietary, page 135). Ordinarily, for "runabout" children from the fifteenth to the twenty-fourth month, four meals daily are necessary. After the second year, only three meals should be given. All feedings should be given at a definite time each day, from which there should be no deviation. Nothing whatever except water should be allowed between meals. My next step, in case these regulations fail, is to place the child temporarily on a markedly reduced diet. No solid food, such as meat, eggs, breadstuffs, vegetables, or fruits, is allowed. The mother must be given the directions both orally and in writing. Milk, gruels, and broths should comprise the nourishment.

If the case is one of milk habit, then the milk must be entirely cut off, and broth, thin gruel, dry bread, or zwieback substituted. The mother is instructed to return with the child in two days. In the great majority of instances the report after forty-eight hours is that the child is ravenously hungry. When such is the case freer feeding is allowed, but under the same strict observance of feeding intervals, with absolutely no feeding between meals. It is extremely rare to meet a case of habitual loss of appetite which will not respond to this simple method of treatment.

Change of Climate.—Occasionally a child is brought for treatment who fails to show the least evidence of disease and yet will not respond to proper dietetic and hygienic measures. For such, a change of climate in addition to proper methods of feeding has been found advisable. A change from the city to the country, or from the country inland to the seashore, has been followed by a decided improvement. When such changes are impossible, or when proper dietetic regulations are impracticable, as with our dispensary patients, medication may be of service.

Tonics.—In my experience the best medicinal means of improving the appetite is a solution of citrate of iron and quinin in sherry wine, one grain of the citrate of iron and quinin being dissolved in one-half dram of sherry wine and given, well diluted, before meals. This dosage will answer for children over eighteen months of age. For

younger children, one-half grain of the citrate of iron and quinin in one-half dram of sherry wine, well diluted, may be given. If this is not successful one minim of dilute hydrochloric acid, one-half minim of the tincture of nux vomica, and two teaspoonfuls of water may be given before meals to children over fifteen months and under two years of age. After the second year two minims of the dilute hydrochloric acid and one minim of nux vomica before meals in three teaspoonfuls of water may be given.

There remain also to be considered under this head not a few children who habitually suffer from poor appetite who are below the average in every respect. This type of child is considered in detail under the heading of The Care of the Delicate Child (page 148).

COMMON ERRORS IN FEEDING

In the bottle-fed the most frequent error is *overfeeding*, or a stronger mixture is given than the child is able to digest. Particularly is this apt to be the case at the commencement of bottle-feeding. The amount is usually too large and the intervals between the feedings are almost invariably too short. *Children of the same age cannot all be fed alike.* Artificially fed babies of equal health and vigor, but of considerably varied size and weight, will require food of approximately the same strength and the same intervals between feedings; but the larger the child, the greater the quantity of food required. Thus, the quantity given at one feeding for a child weighing thirteen pounds at the sixth month will not be sufficient for a child of the same age weighing sixteen pounds.

The quantity of food for each feeding for an average baby weighing fifteen pounds at six months is about six ounces, and this quantity should be diminished one-half ounce for every pound under this weight until the total quantity is reduced to four ounces; and for every pound over fifteen, one-half ounce should be added to each feeding until the total is increased to nine ounces. The number of feedings in twenty-four hours should be the same for all young children of the same age. In the table of food formulas given on page 103, only the average child of average weight is considered.

AGE OF CHILD, SIX MONTHS.

Weight of Child.	Quantity for Each Feeding.
11 pounds	4 ounces
12 pounds	4½ ounces
13 pounds	5 ounces
14 pounds	5½ ounces
15 pounds	6 ounces
16 pounds	6½ ounces
17 pounds	7 ounces
18 pounds	7½ ounces
19 pounds	8 ounces
20 pounds	8½ ounces
21 pounds	9 ounces

Keeping the child on an exclusive milk diet until he is twelve months of age, or older, is a not infrequent error. As a rule, starch in some form may be added to the food at the seventh month, and should always be added as early as the ninth month. The giving of food other than well-cooked cereals and milk before the twelfth month is a mistake made in many households, and a common error from the twelfth month to the third year is to allow the child's diet to consist largely of milk and insufficiently cooked cereals. Crackers and milk, bread and milk, with cake and fancy crackers, often constitute the only articles of diet during this very important period of growth. The fact that a high proteid food is as necessary for proper development now as for the bottle age, is overlooked. During early infancy, milk answered well, but it is not sufficient for the demands of older childhood. Milk, eggs, meat, and cereals, such as oatmeal, rich in proteid, are absolutely necessary to normal growth.

Irregularity in feeding is another frequent error. The child should have his meals "on the minute," at the same time every day. The lack of observance of this rule will surely result in loss of appetite and indigestion. Indiscriminate eating between meals, whether bread and butter, or pastry, or confectionery, if persistently practised, will surely be followed by indigestion and malnutrition.

Forcing or coaxing a child to eat is a practice always to be avoided. If suitable food is given at definite well-ordered intervals, a normal child will be hungry at those intervals. If he does not eat, something is wrong, and it is our duty to discover the cause of his loss of appetite.

DIET FROM THE FIRST TO THE SIXTH YEAR

At the completion of the twelfth month the average well-regulated baby should be weaned and other nourishment given. If bottle-fed, he should receive more than the milk and cereals, with which most children are fed. The food suitable for the second year of life and the method of its preparation and administration are subjects upon which the masses are most profoundly ignorant. A few children at this period of life are underfed, but the great majority are overfed, and carelessly given, at improper intervals, unsuitable food, wretchedly cooked. Summer diarrhea finds its greatest number of victims among those children over twelve months of age who have been carelessly fed.

The Second Summer.—The dreaded "second summer" robs many homes because of ignorant or careless parents. The second summer, managed properly, is hardly more dangerous than any other summer during the early years of a child's life. It is almost an universal custom when the child is weaned or given something other than a milk diet, to allow him "tastes" from the table. Very often these tastes comprise the entire dietary of the adult. Milk is oftentimes the only suitable article of diet that is given. Afterward not

only is the other food selected unsuitable, but it is given irregularly, and supplemented by crackers kept on hand for use between meals. During the hot months the gastro-intestinal tract is less able to bear such abuse and the child becomes ill.

Feeding After the First Year.—Usually when the twelfth month is completed I give the mother a diet schedule, with instructions to begin gradually with the articles allowed, in order to test the child's ability to digest them. Every new article of food should be carefully prepared and given at first in very small quantities. All meals are to be given regularly, with nothing between meals. With many children this expansion of the diet-list is attended with considerable difficulty. They are thoroughly satisfied with milk and refuse all other forms of nourishment. In such cases time and patience are necessary at the feeding-time. The more solid articles of diet should be given first and the milk kept in the background.

Among the underfed seen at this period of life are those who were nursed too long or those who were kept too long upon an exclusive milk diet. A great majority of the cases of malnutrition of the second year are seen in the exclusively milk fed. They are pale, soft, flabby, badly nourished children.

The following is a diet-schedule which I have employed for several years. Each mother is instructed to select, from the foods allowed, a suitable meal:

From the twelfth to the fifteenth month; five meals daily:

7 A. M. Oatmeal, barley or wheat jelly, one to two tablespoonfuls, in eight ounces of milk. (The jelly is made by cooking the cereal for three hours the day before it is wanted and straining through a colander.) Stale bread and butter or zwieback and butter.

9 A. M. The juice of one orange.

11 A. M. Scraped rare beef, one to three teaspoonfuls, mixed with an equal quantity of bread and moistened with beef-juice. Or a soft-boiled egg mixed with stale bread-crumbs; a piece of zwieback and a half-pint of milk.

(Scraped beef is best obtained from round steak, cut thick and broiled over a brisk fire sufficiently to sear the outside. The steak is then split with a sharp knife and the pulp scraped from the fiber.)

3 P. M. Beef, chicken, or mutton broth, with rice or stale bread broken into the broth. Six ounces of milk, if wanted. Stale bread and butter or zwieback and butter. Many children at the above age will take and digest apple-sauce and prune pulp; when these are given milk should be omitted.

6 P. M. Two tablespoonfuls of cereal jelly in eight ounces of milk; a piece of zwieback. Stale bread and butter or Huntley and Palmer breakfast biscuit.

10 P. M. A tablespoonful of cereal jelly in eight ounces of milk.

From the fifteenth to the eighteenth month; four meals daily:

7 A. M. Oatmeal, hominy, cornmeal, each cooked three hours the day before they are used. When the cooking is completed the cereal should be of the consistency of a thin paste. This is strained through a colander, which upon cooling will form a mass of jelly-like consistency. Of this give two or three tablespoonfuls, served with milk and sugar, or butter and sugar, or butter and salt. Eight to ten ounces of milk as a drink. Zwieback or toast.

9 A. M. The juice of one orange.

11 A. M. A soft-boiled egg mixed with stale bread-crumbs, or one tablespoonful of scraped beef (page 129), mixed with stale bread-crumbs and moistened with beef-juice. A drink of milk. Zwieback or bran biscuit, or stale bread and butter.

3 P. M. Mutton, chicken, or beef broth, with rice or with stale bread broken in the broth. Custard, cornstarch, plain rice pudding, junket, stewed prunes, baked apple, or apple-sauce.

6 P. M. Farina, cream of wheat, wheatena (cooked two hours). Give from one to three tablespoonfuls, served with milk and sugar, or butter and sugar, or salt and butter. Drink of milk. Zwieback or stale bread and butter.

From the eighteenth to the twenty-fourth month; four meals daily:

7 A. M. Cornmeal, oatmeal, hominy (prepared as in the above schedule). Serve with butter and sugar, or milk and sugar, or butter and salt. A soft-boiled egg every two or three days. Hashed chicken on toast occasionally. A drink of milk. Bran biscuit and butter or stale bread and butter.

9 A. M. The juice of one orange.

11 A. M. Rare beef, minced or scraped, the heart of a lamb chop, finely cut. Chicken. Spinach, asparagus tips, squash, strained stewed tomatoes, stewed carrots, mashed cauliflower. Baked apple or apple-sauce. A drink of milk. Stale bread and butter.

After the twenty-first month baked potato and well-cooked string beans may be given.

3 P. M. Chicken, beef, or mutton broth, with rice or with stale bread broken into the broth. Custard, cornstarch, or plain rice pudding, junket, stewed prunes. A drink of milk. Bran biscuit and butter or stale bread and butter.

6 P. M. Farina, cream of wheat, wheatena (each cooked two hours). Give from one to three tablespoonfuls, served with milk and sugar, or butter and sugar, or butter and salt. Drink of milk. Zwieback or stale bread and butter.

From the second to the third year; three meals daily:

Breakfast: 7 to 8 o'clock. Oatmeal, hominy, cracked wheat (each cooked three hours the day before they are used), served with

milk and sugar or butter and sugar. A soft-boiled egg, lamb chop, hashed chicken. Stale bread and butter. Bran biscuit and butter. A drink of milk.

At ten o'clock the juice of one orange may be given.

Dinner: 12 o'clock. Strained soups and broths, rare beefsteak, rare roast beef, poultry, fish. Baked potato, peas, string beans, squash, mashed cauliflower, mashed peas, strained stewed tomatoes, stewed carrots, spinach, asparagus tips. Bread and butter. A glass of milk. For dessert: Plain rice pudding, plain bread pudding, stewed prunes, baked or stewed apple, junket, custard, or cornstarch.

Supper: 5.30 to 6 o'clock. Farina, cream of wheat, wheatena (each cooked two hours). Give from one to three tablespoonfuls served with milk and sugar, or butter and sugar, or butter and salt. Drink of milk. Zwieback or stale bread and butter. Twice a week, custard or cornstarch, or junket may be given, or a tablespoonful of plain vanilla ice-cream.

As a rule, three meals answer best at this period. With three meals a child has a better appetite and much better digestion, and consequently thrives far better than one whose stomach is kept constantly at work. Some children, however, will require a luncheon at 3 or 3.30 P. M., and will not do well without it. This is apt to be the case with delicate children, particularly those under two and one-half years of age. If food is necessary at this hour, a glass of milk and a Graham biscuit or a cup of broth and zwieback will answer every purpose. Instead of the afternoon meal, the child may relish a scraped raw apple or a pear. Fruit at this time is particularly to be advised if there is constipation. Children recovering from serious illness will require more frequent feeding.

From the third to the sixth year:

Breakfast: Cracked wheat, cornmeal, hominy, oatmeal (each cooked three hours the day before they are used). These may be served with milk and sugar, or butter and sugar, or butter and salt. A soft-boiled egg, omelet, scrambled egg, chop. Bread and butter, bran biscuit and butter. A glass of milk.

Dinner: Plain soups, rare roast beef, beefsteak, poultry, fish, potatoes stewed with milk or baked. Peas, string beans, strained stewed tomatoes, stewed carrots, squash, boiled onions, mashed cauliflower, spinach, asparagus tips, bread and butter. *For dessert:* Rice pudding, plain bread pudding, custard, tapioca pudding, stewed prunes, stewed apples, baked apples, raw apples, pears, and cherries.

Supper: Farina, cream of wheat, wheatena (each cooked two hours). Give from two to three tablespoonfuls, served with milk and sugar, or butter and sugar, or butter and salt. Zwieback or stale bread and butter. Bread and milk. Milk toast. Scrambled eggs twice a week. Custard or cornstarch each once a week, ice-cream once a week. Bread and butter. A glass of milk.

When the child has eggs for breakfast, they should not be repeated in any form for supper. Red meat should be given but once a day. When the child has a chop for breakfast, he should have poultry or fish for dinner. At this age of great activity and rapid growth, the child will often demand food between dinner and supper. Carefully selected fruit, such as an apple, a pear, or a peach, may be given at this time, supplemented by a Graham cracker or two, or by stale bread and butter, if it is found that their use does not interfere with the evening meal.

DIET AFTER THE SIXTH YEAR

When the normal child has passed the sixth year the diet may be considerably expanded, approximating to that of the adult in variety; certain restrictions, however, are to be borne in mind. Fried foods should not be given, highly seasoned dishes, such as pie, rich puddings, gravies, and sauces, are to be avoided. Salads with plain dressing may now be given. Wine and beer, coffee, and tea should never be given to children as a beverage. A point to be kept in mind in feeding children of this age, as well as those who are younger, is the proper cooking of vegetables. Everything in the line of green vegetables should be cooked until it can readily be mashed with a fork.

HOW THE CHILD SHOULD BE FED

In the foregoing articles on feeding I have endeavored to explain the nature of the food required by the growing child, and the intervals at which food should be given. This, however, does not entirely cover the subject. A child should never dine with adults until he can have adult diet, if the circumstances of the family permit him to dine alone or with other children. It is a refinement of cruelty to expect a hungry child of tender age to sit at the table, see and smell the fragrant dishes, and be forced to content himself without complaint with his restricted fare. I recall this custom as a cause of many tears, disputes, and fistic encounters with attendants, which formed no small part of the daily routine of my own early life.

In feeding, the spoon or fork must come in contact only with the food and the child's mouth. If it falls to the floor by accident it should be dipped into boiling water before using it. Under no circumstances should a feeding utensil be allowed to come in contact with the lips of the nurse or mother. Time and again I have seen mothers and nurses sip or swallow the first teaspoonful of the food which is to be given, to determine if it is of the proper temperature, using the spoon to feed the child immediately thereafter. At other times, when the food is not particularly attractive to the child, she will place the spoon in her own mouth as though intending to take it herself. Or she will remove from the spoon, with her own lips adhering particles of food. There are few more reprehensible prac-

tices than the foregoing, and if parents knew the dangers to which their children were thus subjected they would not for one instant tolerate them. Any one of the many forms of pathogenic bacteria may thus be readily transferred to the mouth of the child. It is unquestionably a means of infection with tuberculosis, diphtheria, and syphilis. The germs of tuberculosis and diphtheria are frequently found in the mouths of perfectly healthy adults. They cause no symptoms of disease because of the normal power of resistance of such adults. The resisting powers of the child, however, to these microörganisms are very slight, and when these germs are carried to the delicate mucous membrane of the infant's mouth and throat they thrive actively, the child develops diphtheria or tuberculosis, and the family grieves and wonders how the child could ever have contracted the disease.

DIET DURING ILLNESS

The digestive capacity of every child is diminished during illness, the extent depending largely upon the age of the child and the severity of the disease. The younger the child, the greater the incapacity. This is fairly constant with all the ailments of childhood, including, of course, those which directly affect the gastro-enteric tract.

Reduction in Food Strength.—In a moderately severe bronchitis, with a degree or two of fever, the digestive capacity is slightly diminished and a 25 percent reduction in the strength of the food will answer. During the critical stage of a lobar pneumonia the digestive powers are held in abeyance and predigested foods and alcohol must sustain the patient. During an attack of measles, scarlet fever, bronchopneumonia, or diphtheria in bottle-fed infants, at the height of the disease, it is my custom to reduce the strength of the food one-half by the addition of water, to make up for the quantity removed. For ailments of lesser severity, such as bronchitis, with a temperature of 100° to 101° F., or chicken-pox, or mild measles, I reduce the strength of the food from one-fourth to one-third. In any mild ailment or injury which confines a child to its bed, the food strength should be cut down, for inactivity as well as disease lessens the digestive capacity.

Among nurslings and the bottle-fed these precautions are particularly necessary. A child with fever is apt to be thirsty and to take more food than in health. This is frequently the case in summer diarrhea. In order to avoid this taking too much food, I not only order the milk to be diluted for the bottle-fed, but I instruct the mothers of nurslings to give a drink of water immediately before each nursing and between nursings, and then to allow the child to nurse only one-half or two-thirds the usual time. For the bottle-fed, one-half to one-third the contents of each bottle is removed and the quantity replaced by boiled water, so that the amount of fluid given remains the same.

If a child is a "runabout," over two years of age, he is given broths

and thin gruel—one-half milk and one-half gruel. By carefully watching the stools, thus fitting the food to the child's capacity, we will avoid grave intestinal complications which, during the summer, often prove to be more serious than the original ailment. In the acute gastro-enteric troubles, and in typhoid fever, all milk must be discontinued.

The dietetic management of the acute intestinal diseases and typhoid fever is referred to in detail under their respective headings.

The Art of Feeding in Illness.—Not only is food oftentimes taken in insufficient quantity in illness, but in many cases it is absolutely refused. In other cases, during coma and asthenic states, swallowing is impossible. In delirium and in conditions of collapse nourishment must be given, and when this is impossible by the natural method, we have, as temporary substitutes, gavage, oil inunctions, and rectal feeding—all referred to elsewhere.

Forcing the child to take nourishment by the mouth is rarely necessary. Coaxing and bribing ordinarily succeed far better. For a child from three to five years of age a bright new penny possesses much persuasive power. The child will usually take its food better from those to whom it is accustomed, like the mother or nursery maid. The trained nurse should understand that while unacquainted with the patient, the simpler requirements of the child are to be looked after by others to whom the patient is accustomed.

The nourishment should be as palatable as possible and served in bowls, cups, or plates that are attractive to the patient, because of color, pictures, or peculiarities of shape. Junket, flavored with vanilla, served cold is a favorite food for sick children of the "runabout" age. Frozen custard and home-made ice-cream, made with one-third cream and two-thirds milk, will usually be well taken. Toast, dry bread, and crackers made in peculiar shapes are attractive to the child. In not a few cases I have succeeded in feeding satisfactorily children two or three years old, when several other schemes had failed, by allowing the temporary return to the bottle, from which they had been weaned for a year or so.

In these difficult feeding cases the child's peculiarities and wishes must be studied. Children in illness require water. Oftentimes they take it in insufficient quantities. Those who refuse plain water will often take ginger ale, sarsaparilla, or vichy. In the event of these drinks being well taken, they may be given freely. In the acute infectious diseases, which include pneumonia, free water-drinking is a therapeutic measure of no mean value.

GAVAGE

Gavage, or forced feeding, is the introduction of nourishment into a child's stomach by means of a tube (Fig. 16). The tubes are to be obtained at the instrument-makers and are known as

"stomach-tubes for children," or the physician can make one himself at a small cost. All that is required is a soft-rubber catheter, American No. 12, a one-eighth inch glass tube two inches long, two feet of one-quarter inch plain rubber tubing, and a small glass funnel. An extra opening should be cut in the catheter about one-half inch from the original one. This allows a more rapid introduction of the nourishment. The opening can very easily be made with a small pair of curved scissors.

In Obstinate Vomiting.—Gavage, or forced feeding, will be found useful in three types of cases. First, as a means of feeding in obstinate vomiting. Several years ago, when the writer was resident physician at the New York Infant Asylum, a series of observations were made on cases of persistent vomiting which could not be controlled by stomach-washing or the ordinary means of treatment. It was found that patients who could not retain a teaspoonful of water when administered by a spoon or a bottle would retain from one-half ounce to one ounce of water when given through a tube. The same child who vomited one teaspoonful of milk or other food would retain this amount and a great deal more when the food was given by the tube. This discovery led to more extended observations. Twenty cases of persistent vomiting in all were treated in this way, of which eighteen were relieved. This series of observations was the first made relating to the use of gavage or forced feeding in persistent vomiting.[1]

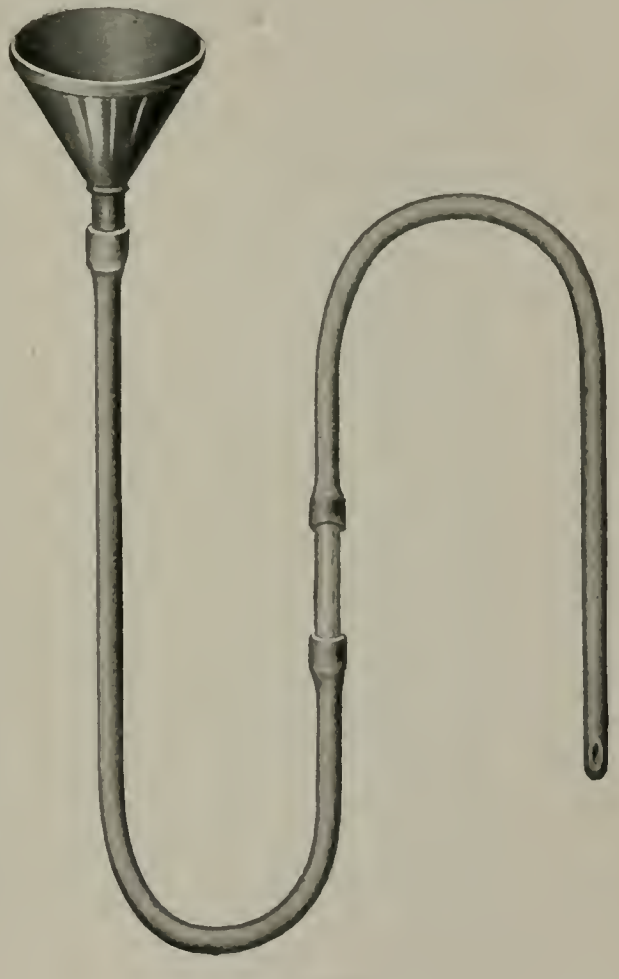


FIG. 16.—STOMACH-TUBE.

The tube which is to be passed into the stomach should never be oiled, but merely dipped into the solution that is to be used. It is then passed in rapidly with the funnel empty and the nourishment

[1] Kerley: "Gavage in Persistent Vomiting in Infants," Archives of Pediatrics, Feb., 1891.

immediately poured into the funnel. When the food has passed into the stomach, the tube should be compressed and quickly withdrawn. Some of the liquid retained in the tube, if it is not compressed, may escape into the larynx and cause choking, coughing, and perhaps vomiting. The food selected should be thin dextrinized gruels, or broths and gruels combined, which have answered well in some cases. When used for the obstinate vomiting cases, it is well to use gavage only once every four or six hours, with from one-third to one-half

FIG. 17.—FEEDING BY GAVAGE.

the quantity of food given in health. In a severe illness, such as diphtheria, pneumonia, and the grave intestinal diseases, gavage may save the life of the patient. Not infrequently, in such cases, insufficient nourishment is taken to support life. Rectal feeding is usually of value only for a day or two, as children soon become intolerant of it. In such circumstances, gavage may be employed advantageously for several days at a time. In fact, it is the only way by which the child can be properly nourished.

The position of the child for gavage may be the same as for stomach-washing, or the child may rest on his back (Fig. 17). It is well to clear out the stomach with warm water before each feeding. In children without teeth the bare index-finger is all that is necessary to keep the mouth open. In children with teeth the Denhard gag of the O'Dwyer intubation set (page 325) should be used. Predigested cereal foods, completely peptonized milk, and stimulants well diluted may be given. Usually these patients badly need water. If there is no tendency to vomiting, a large quantity of water may be given with the nourishment selected, so that they may get as much liquid as they are accustomed to in health. Gavage is also most useful in cases of extreme malnutrition and exhaustion or in those under alcohol or opium narcosis. Infants suffering from an extreme degree of malnutrition and exhaustion are often admitted into a hospital; and occasionally they are seen in private practice. The children are so reduced in strength that not enough energy remains for the taking of nourishment. In these cases gavage is distinctly a life-saving measure. The food should be predigested cereals, peptonized milk, or one of the various peptone preparations, given in quantities suitable to the age of the child. For a child four months of age, from two to four ounces of peptonized milk may be given every two hours. Before the next feeding it is well to introduce a few ounces of water and withdraw it to see if the food has been properly digested. By this means of feeding there will be noticed, if the vitality is not at too low an ebb at the commencement, a daily increase in strength and vigor, which proves that the powers of assimilation persist after the desire for food or the child's ability to swallow it has passed. This proves that we must never regard such a case as hopeless so long as the child is breathing. Time and again, after a few days' feeding in this way, the child will take the food from the bottle or spoon. Breast-milk, if it can be obtained, may be given by gavage as successfully as can predigested cow's milk. The malted foods on the market have been used temporarily with advantage, for, while deficient in nutritive value for the well, they afford sufficient nourishment for temporary use in the very ill, and are easy of digestion.

Illustrative Case.—In a recent case seen in consultation, the patient, three months old, was almost moribund, as the result of extreme malnutrition. The temperature ranged from 94° F. to 96° F. for several days. No food could be taken. A wet-nurse was secured, but the child would not nurse. He was pale, apathetic, and too weak to cry. The wet-nurse's milk was drawn from the breast and spoon-feeding attempted, but swallowing was impossible. One and one-half ounces of breast-milk were fed by gavage, but this proved too strong, and the child promptly vomited it. It was then diluted one-half with weak barley-water. At first one ounce was given at a feeding,

which was gradually increased to two ounces, all being retained and digested. In a week the child was able to nurse, and made a complete recovery, weighing, when seven months of age, fourteen pounds. At the time gavage was commenced, it weighed but five pounds.

SUBSTITUTES FOR STOMACH-FEEDING

In the management of the diseases of children conditions arise from time to time which necessitate the nourishment of the patient by channels other than the stomach. In persistent vomiting, when there is an acute involvement of the stomach, as in an acute gastro-enteric infection, or when the vomiting is due to some more remote cause, as in meningitis or nephritis, or where the attack is one of cyclic vomiting. In short wha ever be the cause, the patient must receive water and food in order to sustain the system until the exciting factor is removed.

Nutrition by means other than the stomach may be necessary in retropharyngeal adenitis or abscess, in stricture of the esophagus, in diphtheria, in the exanthemata, and in pneumonia during the course of active delirium. A substitute for stomach-feeding is often useful in marasmus, in the generally delicate, and in those with reduced assimilative powers. Various means of substitute feeding have been attempted from time to time. Nutritive suppositories have been advocated and proved failures, perhaps because of our inability to place them sufficiently high in the bowel. Placed in the rectum, they excite peristalsis and are expelled.

Hypodermic Feeding.—Hypodermic feeding, and the introduction of food into the circulation, in children are unsafe and impracticable.

Feeding by Inunction.—Feeding by means of oil inunctions, by active friction, or by the more passive means of wrapping the child in oil-soaked cotton and allowing him to rest in it, is thought by many to be effective, in spite of the fact that the skin is an organ of excretion, and that its powers of absorption are very slight. I am convinced that, for infants and young children, the inunctions of properly selected oils possess distinct nutritive value, more benefit being derived by the patient than can be attributed to the lubrication of the skin and the massage. The rubbing of mercurial ointment into the skin is one of the most familiar means of introducing mercury into the circulation. No one will dispute the efficacy of this form of treatment. Fat inunctions are useful in marantic infants, and in delicate "runabouts" with low, fat-digestive capacity. In chronic diseases also, such as tuberculosis, syphilis, and rheumatism, oil inunctions are of advantage. They may be used with service during convalescence from the severe acute diseases which have not only reduced the patient's weight, but have so affected the digestive and assimilative functions that a return to health is materially retarded. A brine bath (page 31) should precede the inunctions, both of

which are best given at bedtime. If possible, an animal fat should be used. Goose oil and unsalted lard are preferred. Cod-liver oil is never advised on account of its very disagreeable odor. Olive oil may be employed in case the unsalted lard or goose oil is not obtainable. Cacao-butter is the least desirable of all fats that may be used for this purpose, particularly if the child is young and athreptic, for the reason that there may not be enough bodily heat to keep the oil fluid after it has been rubbed into the intercellular spaces and hair-follicles. For children under one year of age, it is my custom to direct that one-half ounce of goose oil, unsalted lard, or olive oil be rubbed into the skin of the arms, thorax, legs, and back immediately following the salt bath. The rubbing is to be continued until the oil disappears, which may require from ten to fifteen minutes. The rubbing should be done with the palm of the hand and not with a brush or a cloth. In a few children it is difficult to have the oil absorbed, even though not more than one dram is used. This usually occurs in those who most need the oil—athreptics with low temperature, in whom the superficial circulation is very poor. After the inunction the child should at once be put to bed. For older children, one-half to one and a half ounces of the oil may be used. It will soon be learned how much will be required for the ten to fifteen minutes' rubbing. In these older children, also, the inunction should follow the brine bath. The use of the oil inunction in hundreds of cases has proved its efficacy. How much of the beneficial effects are due to the oil as a food; how much to the massage, producing better skin action, improving the nutrition of muscles and inducing better sleep, I am unable to say. The beneficial effects of the inunction are probably due to three factors: The oil acts to a slight extent as a food, the massage increases the functional activity of the skin and improves the muscle nutrition.

Rectal and Colonic Feeding.—Any means of treatment which is disagreeable both to patients and attendants, and difficult of execution, is very liable to fall into disfavor unless pronounced beneficial results are the rule. While absolutely nothing can be promised so far as supplying nutrition by this means is concerned, careful observation and experience tell us that in a certain number of cases it is a measure of much value. When the treatment will be of service in nourishing the patient can be determined by trial only. In children, particularly in very young children, on account of the ease with which peristalsis is excited, nutrition by this means is less frequently successful than in the adult. Nevertheless it has been of material assistance to me in many a trying situation. Not a few of the failures are due to a lack of appreciation as to the details of the procedure. Directions to mothers or nurses to inject a certain quantity of some particular food, unless specific instructions are given, will usually be carried out as follows: A hard glass or

rubber tip will be passed into the rectum from one to two inches. Through this the fluid is forced. In a very few minutes, perhaps immediately, the bowel empties itself into the napkin or bed-pan, the enema being of no service. This is what may be expected and what will happen when the child is given the nutrient enema in this way. The hard tip placed within the anal ring and the fluid are very apt to excite vigorous peristalsis. In order to have the nourishment retained, it should be carried high up into the descending colon. The advantages of this method are two: It is much better retained, and, on account of the greater surface of mucous membrane with which it comes in contact, it will be quickly and more completely absorbed.

How to Give a Nutrient Enema.—The nutrient enema is best given as follows: A soft-rubber catheter, No. 18 American, or a small rectal tube, adult size, is used, the former being preferred. The catheter or tube is slipped over the small tip of an ordinary fountain syringe. The tube should not be too flexible nor yet too stiff. If too flexible,

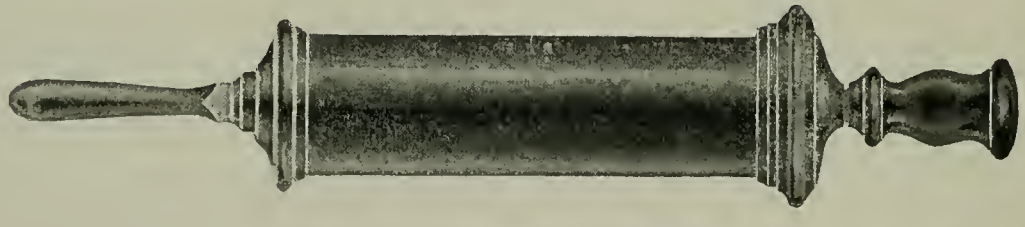


FIG. 18.—HARD-RUBBER PISTON SYRINGE.

it folds readily on itself when the point meets with any resistance, and the fluid escapes perhaps an inch or two within the anal opening. If the tube is too rigid or if force is employed, the mucous membrane and the parts may very easily be lacerated.

The position of the child while the enema is being given is important. He should rest on his left side, preferably in Sims' position, with the buttocks elevated to a plane at least four inches higher than the shoulders. A pillow or a folded blanket covered with a rubber sheet should always be available for this purpose if a bed-pan is not at hand. The child, if old enough to understand, is assured that no harm will come to him. With the patient in position and an assistant to hold him, the anus is covered with vaselin. It is not enough to oil the tube. The tube attached to a fountain syringe is warmed and well oiled and passed into the rectum. The lower end of the bag should be three feet higher than the child's body. There may be some straining at first, but with the child in a proper position and a tube of the right degree of flexibility, it requires but a few seconds to pass it high into the intestine. At least nine inches should be introduced, sufficient, at least, to enable it to be felt in the descending colon when the fluid is allowed to pass rapidly into the

bowel. When the bag is emptied, the tube is rapidly withdrawn and the child, although allowed to change to the dorsal position, is encouraged to rest on his side. In any event, the buttocks must be kept elevated for at least one-half hour. In using small amounts of fluid it is well to allow for the quantity which may remain in the tube of the syringe and in the catheter after the enema is given. In older children, in whom there is much bearing-down or straining, it may be necessary to attach the catheter to a Davidson syringe or to an ordinary rubber (Fig. 18) or glass piston-syringe of large size, in order to provide sufficient force to overcome the pressure exerted by the abdominal muscles.

The nutriment should be neither too hot nor too cold. With either of these extremes, peristalsis is apt to be excited. I have found a temperature of 95° F. to be the most satisfactory. If bowel action has been fairly free, previous washing with a normal salt solution is not necessary. If there has been no movement in six hours, it will be well first to use an irrigation of normal salt solution. Glycerin should not be used. The irrigation should precede the enema by from fifteen minutes to half an hour.

Nourishment Not to be Used in the Rectum.—Do not use oils or fats in any form, even though pancreatinized. Alcohol should be used only in very urgent cases, and then it should be well diluted and used not oftener than once or twice in twenty-four hours. It has a decidedly irritant action on the intestinal mucous membrane and is not well retained. When used, it should be diluted with from twelve to sixteen parts of water or an equal quantity of skimmed milk, which has been peptonized or pancreatinized. In giving stimulants by the rectum, whisky is usually employed in quantities from one-fourth ounce for a child two years of age, to one ounce for a child from six to ten years of age.

Nourishment to be Used.—By far the best food for rectal alimentation is skimmed milk completely pancreatinized. It is better retained and more completely assimilated than is any other means of nutrition which we possess, as shown by its results in maintaining the nutrition and strength of the patient. In cases in which it is desired that a considerable amount of fluid be absorbed by the intestine, the pancreatinized milk may be diluted with a normal salt solution. Where such milk is not available, the whites of three raw eggs, mixed with a normal salt solution, may be given. Not infrequently I order the whites of one or two raw eggs given in the pancreatinized skimmed milk. I believe this combination gives us the best form of nutrient enema. The predigested proprietary preparations, the so-called "peptones," have not been satisfactory in my hands.

Illustrative Case.—In a recent severe case of cyclic vomiting, which was seen in consultation, the vomiting had persisted for three days.

This child was six years of age. There was marked emaciation, with a weak, soft pulse and intense thirst. A nutrient enema was given composed of eight ounces of skimmed milk, pancreatinized, eight ounces of normal salt solution, and the whites of two eggs. Not one drop was expelled. In one-half hour the boy claimed to feel better. The intense thirst was relieved and he fell into a restful sleep. In six hours the enema was repeated, about four ounces being expelled. This was followed by enemata at eight-hour intervals, eight ounces of the milk with the whites of two eggs being given, all of which was retained. At this point the vomiting abruptly ceased and further enemata were not required.

The amount of nourishment to be used at one time varies with the age and condition of the child.

ORDINARY AMOUNT TO BE GIVEN IN ENEMA

Under 3 months	2– 4 ounces
From 3 to 6 months	4– 6 ounces
From 6 to 24 months	6– 8 ounces
After the 24th month	8–16 ounces

Because the first enema is not retained, it does not follow that a second given immediately thereafter will share the same fate. In not a few instances I have given the second enema ten minutes after all or the greater part of the first had been expelled, and the entire amount of the latter was retained. It is rarely wise to repeat the enema oftener than at six-hour intervals; and, when the intestine shows a tendency to intolerance, the intervals should be increased to eight or ten hours.

This means of nutrition in children is but for temporary use at best. The period of its application in the average case, even when tolerated at first, is only two or three days. In a few instances I have been able to use it longer than this. During the summer of 1903 a very delicate three-months-old child under my care, weighing six pounds and ten ounces, retained two ounces of completely pancreatinized skimmed milk, given at six-hour intervals for three days, and three ounces at eight-hour intervals for eight days longer, making a period of eleven days in which the enemata were employed. Such tolerance of the large intestine is very rare, however.

In another case the use of enemata following an operation for intestinal obstruction with protracted vomiting and prostration unquestionably saved a child's life.

THE DELICATE CHILD

In pediatric practice one frequently meets with children who, while they cannot be said to be suffering from any disease or pathologic condition, yet are inferior in physical development, lack endurance, and possess poor resisting powers. They are usually under height, always under weight, and, in short, have so many

characteristics in common that they constitute a class themselves, and as such warrant our attention.

Normal Development.—The average child, at the various periods of early life, conforms with a certain degree of regularity to the mental and physical development which by long association we have come to regard as normal. Thus a standard may be said to have been established, and it is up to this standard that we expect the growing child to measure. This is what we look upon as the average of physical and mental development. A few children exceed these requirements; they are stronger and larger at the sixth month than the average child at the ninth month. Again, older children at the fourth or fifth year are in every way equal to their normal playmates a year or two older.

Abnormal Development.—On the other hand, there are children who are born with a reduced vitality, or who, through faulty management, usually in relation to feeding, acquire a reduced vitality. Semi-invalid adults almost invariably beget semi-invalid children. If the parents are of average health and of good habits, and the debilitated condition of the child is due to faulty management and nutritional errors, the result of proper dietetic and hygienic management is usually prompt and satisfactory. With the persistently delicate, the offspring of physically enfeebled parents, the results are less satisfactory.

Treatment.—By proper regulation of the habits of a delicate child, however, as regards all the details of his daily life, a far better adult is produced than if no such effort had been made. In other words, a diet and general régime of life best adapted to the individual in question will invariably improve the physical condition of that individual. This applies to the strong as well as to the delicate, to the growth and development of the young of the lower animals as well as to the offspring of man. It is the poorly developed, delicate child that we are particularly to consider—the undersized, frail, small-boned, under-weight child, whose appetite is persistently poor or capricious, who sleeps poorly, tires easily, is usually constipated, who is subject to catarrhal conditions of the respiratory tract, and whose powers of resistance generally are diminished.

On assuming the management of one of these children it is absolutely necessary to make a thorough examination, followed in some instances by a few weeks' observation, in order to become acquainted with the case in its individual aspects, to learn idiosyncrasies, and to eliminate the factor of actual disease as a causative agent. When we demonstrate to our satisfaction that the child is free from such diseases as tuberculosis, syphilis, and malaria; when we have eliminated by properly directed treatment all causes, such as adenoids, phimosis, adherent clitoris, vaginitis, or parasitic and irritant skin lesions, which may have had a deterrent influence

upon growth; and when we have satisfied ourselves as to the actual condition of our patient, we are in a position to lay down definite rules of management.

Every child has a distinct function to perform. As soon as he is born he is confronted with a serious problem—the problem of growth, physical and mental. Inasmuch as this growth and development depend, above all things, upon a properly adapted food-supply, it must be our first step to provide such nutriment as will be most conducive to it. As growth takes place in all parts of the body through cellular activity, the nutritive elements which support cell proliferation must be important constituents of the diet, and among these the proteids are of prime importance; hence in the management of these children a point to be remembered in the adaptation of the food is the necessity of feeding as rich a proteid as the child can assimilate. The younger the child, the greater the necessity for growth.

Regular Weighings Necessary.—An infant should be weighed at regular intervals, and if under one year of age, should not be considered as doing even passably well if not gaining at least four ounces weekly. When a baby remains stationary in weight its development is invariably abnormal. When stationary or when only a slight gain of one or two ounces weekly is made, we will always find after a few weeks that there is malnutrition; in spite of the apparent gain, as will be evidenced by the symptoms of beginning rickets—anemia, the characteristic bone changes, flabby muscles, and a tendency to disease of the mucous membranes. Delicate infants should be weighed daily at first; then, as improvement takes place, at intervals of two or more days, but never less frequently than once a week, if under one year of age, no matter how vigorous they may become. The weighing keeps us directly in touch with the child's condition, but since the increase may be in fat alone, an occasional examination of the child stripped is necessary to tell us whether there is substantial growth in bone and muscle.

Feeding Infants.—When it is demonstrated that a child will not thrive on the breast of the mother, another breast should be substituted, or an adapted high-proteid cow's milk should form the diet in part or in whole. If the child is bottle-fed and it is demonstrated that proper growth and development are impossible on cow's milk, on account of proteid incapacity, then a wet-nurse should be secured.

When, after the first year, more liberal feeding is allowed, the necessity for a high proteid in the food selected is as urgent as before. This applies to those children who are brought to us showing evidences of late malnutrition, as well as to those whom we have had under our care from early infancy.

An important element in the diet up to the third year is milk. A child from the first to the third year ought to receive one quart of milk daily. Unfortunately, many debilitated children have a very

poor capacity for fat assimilation. When given full milk in as small an amount as one pint daily, they often develop foul breath, coated tongue, and loss of appetite, or they suffer from frequent attacks of acute indigestion. The milk is necessary, not because of the fat, which can easily be dispensed with, but because of the high percentage of proteid which it contains—from 3 to 4 percent. When this fat incapacity exists, the milk is said to "disagree," but skimmed milk will be taken without inconvenience. Enough sugar may be added to bring the percentage up to seven, in order that it may replace the fat, for fuel. Skimmed milk with sugar added furnishes a food of no mean order. Too much milk, however, must not be given. When large quantities, more than one quart daily, are taken, the desire for more substantial nourishment, such as eggs, meat, and cereals, is removed.

At the completion of the first year, keeping in mind a high proteid (page 93), begin with scraped beef, at first one teaspoonful once a day, in addition to the cereal and milk. If this is well borne, and it usually is, a teaspoonful may be given twice a day, and later three times a day. It may be given immediately before the bottle-feeding. Eggs should be brought into use from the twelfth to the fifteenth month. At first one-half an egg, boiled two minutes, is given mixed with bread-crumbs. If well borne, a whole egg may be allowed. The cereals used should be those most rich in vegetable protein, such as oatmeal, containing 16 percent of proteid, dried peas, 20 percent of proteid, and dried beans, containing 24 percent of proteid. The peas, beans, and lentils should be given in the form of a purée.

Diet after the First Year.—If the child during the second year has an indifferent appetite, reduce the quantity of milk; never allow more than one pint of skimmed milk daily for the first week or two. Many delicate children who apply for treatment after the first year of age have been subjected to as grave errors in diet as are seen among the bottle-fed. Starch and milk oftentimes furnish the only means of nutrition up to the fourth or fifth year, the starch used being generally in the form of bread, crackers, and ill-cooked cereals. In one case four quarts of milk were taken daily by a boy of seven years.

It will be seen that it is our aim in this class of children—the delicate, undersized, slow-growing class—to give as liberal a nitrogenous nourishment as is compatible with the digestive capacity of the patient. But if the child has had rheumatism, or if there is a tendency to lithiasis, the use of a large amount of meat is contraindicated. It is in such children that the high-proteid cereals are particularly valuable. In a general way, from early life the diet of the delicate child should consist of milk, suitably adapted, with highly nitrogenous cereals added, when permissible. Many

delicate children of the "runabout" age who cannot digest milk containing 4 percent of fat will easily digest butter fat when spread on bread or potatoes. In this way I often use it to supply fuel to act as a proteid-sparer. Oatmeal-water, or oatmeal jelly, mixed with the milk should be ordered at the seventh month. When age allows, the addition of raw or rare meat, poultry, eggs, and purées of dried peas, beans, and lentils should be given. Boxed, "ready to serve" cereals are never given; raw cereals are used, which are cooked three hours. While a high-proteid diet is desirable, other things are necessary. Green vegetables, animal fats, the ordinary cereals, cooked and raw fruits, are required to furnish the necessary acids and salts, as well as the necessary variety. In short, the ideal diet for a delicate child is that combination of foods which, while imposing the least burden upon the digestive organs, supplies the body with material exactly sufficient for its needs, and such a food must be rich in nitrogen. (See dietary, page 134.)

Baths.—On account of the fear that a delicate child may take cold, the bath is often omitted. Every child, both the well and the delicate, after the second week should be tubbed daily. The delicate particularly require it. The salt bath (page 31) is usually advised. The best time for giving the bath is at bedtime, and in order to avoid all chance of exposure the temperature of the room should be elevated to 80° F. The temperature of the water may vary. It should never be above 95° F. except for very delicate young children in whom there is a tendency to a subnormal temperature. Even in these cases the temperature of the bath should never be higher than the temperature of the body. In the frail and in the very young the bath should not be continued over five minutes. In older children, those of eighteen months or over, if the physical conditions allow, a distinct advantage will be gained by a reduction of the temperature of the bath while the child is in the water. An immersion in water at 90° F., followed by a gradual reduction during the space of five or six minutes to 70° F., should, upon brisk rubbing, be followed by a quick reaction. For children after the third year, a graduated cold spinal douche has served me well. (See Spinal Douche, page 29.) If the reaction is not good, if the extremities are cold and are slow in becoming warm, the reduction in the temperature should be less or none at all. In the very poorly nourished, a reduction below 80° F. should not be attempted. Following the drying process, primarily for the benefit of the massage, goose oil or olive oil should be rubbed into the skin over the entire body for from five to ten minutes. The bath and the massage inunction, besides favorably influencing nutrition, are a very effective means of inducing sleep.

Fresh Air.—Delicate children are usually deprived of a proper amount of fresh air, for the same reason that they are insufficiently

bathed—the fear of making them ill. All children need an abundance of fresh air, both in illness and in health. The robust and the delicate require it, and to the delicate it is much more essential than to the robust. As many hours daily as practicable should be spent out of doors. The time thus spent depends upon the season of the year and the residence of the child, whether in the city or the country. In the city, during the colder months with pleasant weather, the child should spend at least five hours daily in the open air, dividing the day into two outing periods—from 9 to 11.30 in the morning and from 2 to 4.30 in the afternoon. On very cold days, 20° F. or below, on stormy days, and on days with very high winds, the child is given his airing indoors. He is dressed as for out of doors, placed in his carriage, and left in a room, the windows on one side of the room being open. Not infrequently during February and March delicate children will be prevented from going out of doors for several consecutive days. If some means for a daily systematic indoor airing is not provided, these children will often go backward, no matter how excellent the other management. The first symptoms are loss of appetite and the ability to assimilate the food. In my private work among athreptics, the child is placed in the baby-carriage or in a basket and allowed to rest before an open window for ten or twelve hours of every twenty-four, with a hot-water bottle at his feet. Here he is fed, being removed only temporarily to warmer quarters for a change of napkins. I have three roof-gardens in operation. A boy patient nine months of age has been in the street only once in four months, then only in going to church to be baptized.

Sleep.—The delicate child requires no more sleep than does the strong, and the rules governing this matter at the various periods of life are the same both for the strong and for the weak. (See Sleep, page 27.) The sleeping-room of the delicate child should always communicate with the open air by a window, either directly or through an adjoining room. A satisfactory method of ventilation is by the window-board (page 44). The child should occupy the room alone, if possible, sharing it neither with an adult nor another child. This applies to all ages, but is particularly necessary after the second year.

The Nursery.—The temperature of the nursery, day or night, should never be above 70° F., during the colder months, and in the very young, or in those who are difficult to keep covered, it should not go below 65° F. at night.

Delicate children of the "runabout" age are very susceptible to colds. In the management of such children it is necessary to use every precaution against exposure. The most frequent way of exposing a child to cold is by allowing him to sit on the floor. To keep the child of from ten months to three years of age off the floor

during the winter months, and thereby to eliminate this means of exposure, is a very difficult matter. In fact, with active children learning to walk, or who have just learned to walk, it is practically impossible under the usual conditions. During the colder months there is always a current of cold air near the floor, and allowing the child to creep in winter, even if the floor is protected by rugs and carpets, is one of the surest ways of permitting him to take cold. If he is allowed to walk on the floor he is soon very sure to sit down. If he is not allowed to creep and walk about at will, he will not get the proper exercise and will show faulty development. For such cases, I have found the exercise pen of immense service (see Fig. 4). After being dressed, washed, and fed, the child is placed in the pen, on a rug if desired. Toys are given him and the door is closed. He can now roam about at will, stand up, sit down, creep or walk without the slightest danger from drafts.

Influence of Climate.—Much has been written regarding the influence of climate in the type of case we are considering. According to my observation, this matter does not deserve the attention it has received. The city child in a well-to-do family is, as a rule, better off for eight months of the year in his own home with its usual conveniences. The benefits attributed to change in climate are usually the result of a change not of climate but to more fresh air, which is afforded by the larger rooms of the hotel, with its loosely constructed doors and windows; and since the parent is desirous that the child shall receive the full benefit of the change, he is kept in the open air for a much longer time than when at home. The air at such a place is more expensive, and consequently more appreciated than the air at home. With sufficient heat and proper ventilation, we may make our own climate. It is not to be denied, however, that a change of residence for a few weeks from New York to Lakewood or Atlantic City during March and April is sometimes of advantage.

From the first of June to the first of October the delicate child should not remain in New York city. The humidity and the heat which may prevail for protracted periods during this time render it unsafe, particularly during July and August. The seashore for the entire summer is not to be advised. The children whom I have sent inland to the country and to the mountain have, as a rule, returned in the autumn in a much better physical condition than those who spent the summer by the sea.

Clothing.—Thin, poorly nourished children require more clothing than do those physically normal. A fairly good index as to whether a child is sufficiently clad is the condition of his lower extremities. The forearm and hand cannot be relied upon. The legs and feet of every child should always be warm to the touch.

As to the nature of the clothing: A mixture of silk and wool next to the skin is most desirable. As a second choice a mixture of

wool and cotton is used. The linen mesh, often useful in the vigorous "runabout," is not to be advised in the delicate.

Exercise.—Moderate exercise is to be encouraged. But it should never be allowed to the point of fatigue. In large cities all delicate "runabouts" from three to five years of age should be allowed to walk not more than six blocks in going to the playgrounds. If the distance is greater, the child should ride part of the way, play or walk for a time, and then be placed in the carriage or cart and ride home. Younger children, two or three years of age, should be wheeled both ways and taken out at the park for a run when the weather conditions permit.

Midday Nap.—Every day after the midday meal the child, regardless of age, whether two years or six, should be undressed and put to bed for two hours. He should be left alone in the room, and whether he sleeps or not he should remain in bed for the two hours.

Entertainment.—Entertaining play is necessary, but every kind of excitement, such as children's parties, emotional plays at the theater, and rough play with older children, should be avoided.

Education.—The delicate child under eight years of age should be taught only to the extent of strict obedience and good habits. Other than this he should be a little animal. There should be no teaching in the ordinary sense of the term, no mental stimulation, until the child is physically able to bear it. When school-work begins, which in this class of children should never be before the eighth year, the studies should be made easy and the school-hours short. Such children should never be crowded. I usually direct that they attend only the morning session.

The delicate child should be carefully watched from the time it comes into our hands until it reaches the normal or until the period of development is completed. While the scheme of management as outlined will not always be attended with brilliant results, it will not be in vain. Many lives will be saved, and as a result of the increased acquired resistance, stronger men and women will be added to the race than would otherwise have been possible.

Now and then I meet with a case among the well-to-do in which, because of prolonged faulty feeding or vicious heredity, the vital spark is so low that, fan it as we may, no impression is made upon it. As a rule, these stubborn cases are the offspring of alcoholism and debauchery. They are thin, anemic infants; they develop into thin, anemic children, and into thin, anemic adults. The delicate and degenerate are found in all the walks of life, but they are especially numerous in dispensaries and in children's institutions.

Much of the work of the pediatrist is with the weakly of the so-called "better class." His success in the management of these delicate children depends largely upon the home coöperation, and a promise of this he should obtain before taking the case. The

parents must be taught that the development of the intellect, the character, and the body go hand in hand, and that a vigorous intellect is rarely found without a vigorous body. It is impressed upon them that the body is more than a machine. It has delicate organs to hold, to keep in repair and supply with energy. It has a nervous organization; it has sensibilities. The normal exercise of all these functions demands the normal nourishment of the body. In my experience, family coöperation in a few instances has been difficult to obtain. The parents began well, but soon tired of the extra work required. The care of the young has always been undertaken in such a wretched, unscientific manner that it is difficult to make the untrained mind appreciate the necessity of careful attention to details in his management.

The Child vs. the Animal.—It is a startling fact that 75 percent of all children do not get as scientific care and attention, as regards the selection of food, housing, and exercise, as do the calves and colts, the lambs and pigs, of any high-class stock-farm. Is this because the child has no market value in dollars and cents? In France, during the past few years, this defect in the people as a whole has received governmental attention; and on account of the diminished birth-rate, the value of a human life is beginning to be appreciated. That the subject of better care of the young deserves our earnest consideration is well illustrated by the statement recently made in the House of Commons, by Sir William Anson, Parliamentary Secretary of the Board of Educators, that sixty thousand children of those attending the London schools were physically unfit for instruction. The Adjutant-General of the English Army Medical Service reported that one man in every three offered as recruits ought to be rejected.

MARASMUS; ATHREPSIA; INFANTILE ATROPHY

Under this title will be considered those cases of marasmus which are associated with and dependent upon derangement of function of the gastro-enteric tract. Tuberculosis, syphilis, and atelectasis are consequently excluded, these affections being considered elsewhere under their respective headings.

Marasmus is seen most frequently in young infants under nine months of age. Cases are frequently seen, however, from the ninth to the twelfth month, and comparatively few between the twelfth and eighteenth months. A great deal of research work has been done in marasmic infants in order to determine the nature of the condition, but as yet no satisfactory explanation has been offered. The disease is unquestionably due to defective intestinal assimilation. The principal fact that disproves the existence of any atrophic condition or any necessarily severe derangement of function is that these cases very often make complete recoveries, becoming perfectly normal children after three months or more of treatment.

The story of these cases, which we have heard hundreds of times, both in out-patient and in private work, is about as follows: The mother could not or did not nurse the baby. The child was put on cow's milk, which was usually given too strong or in too large quantities—oftentimes both errors were combined, or the milk may have been too old when used and improperly cared for; in any case the milk disagreed, the child was made ill, there was loss in weight, cow's milk was discontinued, and one of the infant foods, alone or combined with milk, was given; but, the child's digestion being thoroughly disordered, the foods failed to agree. There was vomiting or regurgitation with undigested green stools, or both combined, while the loss in weight continued. The child may have been inherently weak or there may have been a cow's-milk idiosyncrasy to help account for the lack of success in the milk-feeding. Usually there followed a series of experiments with different kinds of food and methods of feeding, the vomiting, diarrhea, or colic continued with wasting, and when the child reached the dispensary or office he was perhaps six months of age and weighed from six to nine pounds, presenting a typical athreptic picture. Some of these children are born with a digestion that is apparently incompatible with cow's-milk mixtures. Others have their digestive capacity for cow's milk hopelessly deranged by improper feeding methods. The majority of the cases occur among the overcrowded tenement poor—the worst possible environment for a delicate infant. There is little or no proteid assimilation, so that any approximation to normal growth is impossible. They may also possess a poor fat capacity, and if there is also a diminished sugar capacity the proteids of the tissues are drawn upon to supply heat and energy, with resulting progressive emaciation. Heredity, environment, and the season of the year, all influence the prognosis.

Treatment.—An important determining factor, however, as to the child's future, depends upon whether or not he can have the advantage of a wet-nurse. That a great majority of the cases of simple athrepsia recover, and often recover promptly, making a most satisfactory growth, when a wet-nurse is secured, is proof, as above stated, that the condition depends more upon the nature of the nutrition than upon the patient, so far as relates to any peculiar systemic state or pathologic condition. In securing a wet-nurse the physician's duties are by no means completed. The patient may not take kindly to the breast and he will have to be taught breast-nursing. A great deal of time may be required in teaching older infants, those who have been on the bottle for seven or eight months. To this end, various devices may have to be used. For the first nursing it is well to allow the child to go for an hour or two beyond the feeding-time in order that his appetite may be voracious. It is advisable also to give the first few nursings in a darkened room with the

person who has been accustomed to feeding the patient very near. Sufficient milk should be forced from the breast to enable the child to taste it. A little powdered sugar sprinkled on the nipple is a good means of increasing his interest. In some instances it has been necessary to cover the wet-nurse with a blanket or sheet, leaving only the breasts exposed; or it may be necessary to use the nipple-shield (Fig. 8) for a few days in order gradually to accustom the child to the change. I have yet to see a case in which success did not follow persistent effort. Oftentimes the nurse's milk will not agree at first; but this is not surprising and need cause no discouragement. Breast-milk ordinarily is a much stronger food than the child has been accustomed to, and it may produce vomiting or colic or diarrhea. When indigestion follows, the nurse's milk should be modified by giving the baby weak barley-water or plain boiled water before the nursing, in case he nurses well, or after the nursing in case he nurses poorly. One or two ounces of breast-milk at a feeding is all that these patients can be expected to take during the first few days. The amount obtained may readily be determined by weighing the patient, without the trouble of undressing him, before the nursing, and then weighing him at intervals of from three to five minutes after the nursing has commenced. An ounce of breast-milk is practically an ounce avoirdupois. These children, if they are not too weak, will take greedily almost anything from the bottle. The addition of an ounce or two of barley-water or plain water dilutes the milk and renders it easier of digestion, and furnishes at the same time the necessary fluid for the child. The most unpromising cases of marasmus are not to be despaired of nor the treatment relaxed, although the physician should be cautious in his prognosis. Hospitals and institutions for children always carry a certain number of these cases. It is not infrequent to find miliary tuberculosis at autopsy where it was not suspected during life, no clinical signs of fever having been present. If the child is too weak or indifferent to swallow, the wet-nurse's milk may be expressed, diluted, and given by gavage. I have in a few instances peptonized the wet-nurse's milk.

Illustrative Case.—The most pronounced and the most hopeless recovery case coming under my observation was seen by me in consultation in one of the suburbs of New York. The child was four months old and weighed five pounds. He was emaciated to a skeleton, having weighed eight pounds at birth. The temperature for several days ranged between 92° and 94° F. A trained nurse and an unusually intelligent mother were in charge. I doubted the accuracy of the thermometer reading, and different thermometers were used. The temperature was taken by the rectum. I took the temperature myself on one or two occasions with my own thermometer and found the reading correct. The attending physician had also taken it repeatedly, so that there was no doubt as to the matter. The child was too weak to nurse. The breasts

were accordingly pumped, and for each feeding he was given one-half ounce of breast-milk with an ounce of barley-water, to which a few drops of sherry wine were added. This was given by gavage at two-hour intervals. He was wrapped in flannel and wool and surrounded with hot-water bottles. The food was retained and digested. In four days he could nurse, and was allowed to take a small amount from the breast and finish the meal with barley-water. The temperature gradually rose to the normal. More breast-milk was allowed as he proved able to care for it, and the child made a perfect recovery, weighing eighteen pounds when he was nine months old.

This case demonstrated to me that a marasmic child is never a hopeless case until he ceases to live. Unfortunately very few marantic children can have the benefit of a wet-nurse, but without her the majority of these cases are hopeless. I have seen such cases take their modified milk or whatever was given them without inconvenience. The stools may be offensive if cow's milk is given, or there may be constipation or the stools may appear perfectly normal. As a rule, there is no serious diarrhea or any other evidence of an acute inflammatory process in the intestine. However, in spite of fairly normal stools, the patient grows thinner and thinner. After a time all food is refused, gavage is used as a last resort, and the child finally dies. The autopsy shows nothing but pale organs with perhaps a strip of hypostatic pneumonia. Now and then one of these cases in a children's institution or in a hospital recovers without a wet-nurse, but it is the exception proving the rule. Put these athreptics on a wet-nurse, as I do at every opportunity, and many of them thrive in spite of the well-known unfavorable influence exerted by institutional life upon the very young. In addition to putting the athreptic baby on the wet-nurse, his stomach should be washed once daily and he should live out of doors.

Outdoor Life.—Next to the wet-nurse, I know of no measure fraught with so much good as is outdoor life. The season of the year exerts considerable influence on the prognosis. The athreptic bears the heat and humidity very badly, and the early summer mortality of all large cities is materially increased by these children, who wilt and die in institutions and tenements with the first two or three days of continuous hot weather. Parents of such children residing in a large city who can afford it, should send them to the country not later than June 1st, to return, in this latitude (New York city), not earlier than October 1st. During the day the child should be on a porch or in the shade continuously. At night the windows of his sleeping-room should be wide open. During the colder months if the child is too ill to be taken out of doors he should have from morning until evening a continuous indoor airing (page 37), and the sleeping-room should always communicate with the open air. The roof-garden in large cities is a most valuable aid in the management of athreptic children.

Tenement Cases.—While much has already been said about this

most interesting and important subject, one phase of it has not been touched upon. I refer to the athreptic infant of the tenement, and those others in private life for whom a wet-nurse is impossible. They furnish by far the largest number of our marasmic patients. Perhaps the most frequent error in the management of these cases is an endeavor to select at the start a food for the child to *thrive* upon. In doing this, almost invariably a stronger food is selected than the child is capable of digesting, and he is made worse by the attempt. Our ultimate object in these infants will be more readily attained if, at first, we attempt only to supply the child with a food upon which he *can exist* without loss in weight. The number of calories necessary for an athreptic child is not great. It must be remembered, furthermore, that we are not dealing with a case of infant-feeding as the term is commonly understood. True, we are feeding an infant, but a sick infant, and the methods of feeding used in the comparatively well do not apply here in all respects. The problem of nourishing these children is to be considered from two standpoints—that of the food and that of the baby, with special reference to his organs of digestion. The stomach, in many of these infants, is dilated, with a consequent lack of motility. Residual undigested food remains long after feeding. There has been a constant fermentative change, with the production of lactic and butyric acids, resulting in local changes of an inflammatory nature in the mucous membrane of the stomach, so that not only must the organ be prepared for the food, but the food must be adapted to the stomach capacity, and when this is done, when both receive due consideration, we are much more likely to succeed.

Stomach-washing.—In all of these cases, for the first few days of treatment, I wash out the stomach with sterile water, regardless of the presence of vomiting and regurgitation and regardless as to whether the child is bottle-fed or breast-fed. It is often surprising to note the amount of thick mucus and undigested food that will be washed from a stomach from which there has never been vomiting. The daily washings enable the child to take more food and stronger food. It may be necessary to continue the washings for days. They may first be discontinued when the water siphons clear and without mucus. They should be repeated if there are indications calling for it, such as regurgitation of sour water or mucus or a loss of appetite. In a case seen recently in which there was chronic gastritis with athrepsia, washings were continued at gradually lengthened intervals for six months.

Feeding.—If the case is one with pronounced stomach involvement, a 3 percent milk-sugar solution is given for twenty-four hours in quantity suitable for the age and size of the patient. The following day barley-water No. 1 is given, to which sugar is added to make the mixture 5 percent.

Cow's Milk.—While it is doubtful if the child can take cow's milk after this period of stomach-rest and stomach-washing, it may

be attempted. Two drams of as safe milk as can be obtained is added to every second feeding of the barley-and-sugar water. If it agrees, after a day or two, two drams are added to each feeding, with a gradual increase of a dram every two or three days. The intervals of feeding, for children under one year of age, may range at from two to three hours. It is rarely advisable to feed even the most delicate athreptic oftener than once in two hours. If the milk can be retained and assimilated in the strength of one-fourth milk and three-fourths barley with 5 percent sugar, or if an equal quantity of milk and sugar-water alone is found to agree, the child will begin to grow and general improvement will follow rapidly. If the cow's milk is not well borne, skimmed milk (page 96), or a weak cream mixture —one-half dram of cream to a feeding—may be tried. It is practically impossible to have whey made properly outside of a hospital laboratory or an intelligent home. In using whey it may be given in quantities suitable to the age of the patient. The prescribing of cream among the poor is a hazardous procedure for these infants. It may be old, improperly cared for, and swarming with bacteria. If there is a tendency to looseness of the bowels the diarrhea is thus made worse. Cream mixtures rarely succeed as foods for athreptic children. I use it only among those who can properly care for it.

Condensed Milk.—I have found that in the out-patient athreptic the much-abused condensed milk fulfils a useful function. It is the cleanest food we can give the dispensary baby. It is the cheapest, the most easily kept, and the most easily digested milk that can be furnished him. Consequently when cow's-milk feeding is impracticable or when it disagrees, I give condensed milk, beginning with one-half dram, which is added to the barley-water or to the plain water for every second feeding, later to every feeding, increasing the quantity gradually as the child shows an ability to digest it. The patient must be seen frequently and the stools carefully examined in order that an increase in the food strength may be made as soon as conditions allow. The mother is told to bring the napkins to the dispensary, the child is weighed at each visit, every second day, and it is most gratifying to see how well some of them gain in weight, not because they are getting an ideal food by any means, but because it fits the case, temporarily. Condensed milk is thus used as a stepping-stone to something better. When the child has taken it with benefit for a month or six weeks, cow's milk is attempted if the time of the year is between October and the following June. After June 1st I would continue with condensed milk, as a baby showing some degree of anemia and rachitis as the cooler months approach is to be preferred to the risk of attempting cow's-milk feeding, with poor milk, in the hands of overworked or ignorant mothers.

In beginning cow's milk, in order to avoid sudden radical changes I replace one feeding of the condensed-milk mixture daily with one feed-

ing of a weak cow's-milk mixture. In some cases this will produce illness and must be stopped; in others, it will be well borne. When it is found to agree, two feedings should replace two condensed-milk feedings daily. In this way, by increasing by one the number of cow's-milk feedings every third or fourth day, entire cow's-milk feeding may safely be inaugurated. The strength of the cow's milk should not, of course, correspond to that suggested for well babies. For a child of six months a three-months' formula may be given. As the child improves, the strength of the milk may correspondingly be increased. In this way I have treated successfully a great many tenement athreptics.

Some children will be able to take and properly care for only two cow's-milk feedings daily; others will take every second feeding of cow's milk. I have a patient at the present time aged fourteen months. He will take two cow's-milk feedings daily with comfort, but when the third is given he is invariably made ill. Some will not be able to take a particle of cow's milk. When this is the case, the condensed milk should be combined with a gruel, such as oatmeal, which contains a high percentage of proteid. These cases may also be given beef-juice at a very early age. I often use pure cod-liver oil, from fifteen to thirty drops, which is usually taken three times daily without disturbance. The tenement athreptic is given the benefit of as much fresh air as possible. He is also given the advantage of the daily tub-bath and the oil rub.

MALNUTRITION IN INFANTS

I am often asked by students the difference between malnutrition and marasmus in infants. While hard and fast lines cannot be drawn as to where malnutrition ends and marasmus begins, there is a vast difference between the two conditions. Malnutrition may best be described as the first stage of marasmus. Every child with marasmus must first have undergone a longer or shorter period of malnutrition. In malnutrition the infant is under-weight, his gain being slow and irregular, the muscles are soft, and if the condition persists, bone changes, indicating rachitis, appear. Malnutrition may be the result of faulty digestion and assimilation engrafted upon faulty feeding, often combined with overfeeding. The patient shows evidence of indigestion in a distended abdomen and in stools that are far from the normal, or there may be no intestinal derangement whatever, the malnutrition being due to the fact that the child's diet for months had consisted of food that did not contain the nutritional elements required. Infants who subsist for a considerable length of time on a diet of condensed milk or the malted infant foods, without cow's milk, almost invariably show signs of general malnutrition.

A case due to high-fat feeding was recently seen by me. The patient was a male, six months of age, weighing thirteen pounds,

resident of a New York suburb where the conditions are most healthful. His fontanel was slightly depressed, the muscles were soft and flabby, the ribs beaded, and the child had lost his appetite and suffered from constipation. A history of the feeding showed that he had been getting a cow's-milk mixture containing approximately 6 percent fat, 4 percent sugar, and 2 percent proteid. In this patient the indigestion, loss of appetite, and constipation were unquestionably due to the high percentage of fat. The energy exerted in digesting the food almost counterbalanced the benefit derived from it, the result being a very slow gain in weight.

Treatment.—*Diet.*—The management of malnutrition due to such causes consists in correcting the digestive errors, in using castor oil or calomel with stomach-washing, and in adjusting the food to the child's requirements and digestive capacity, always remembering that a child who should have from 3 to 4 percent of fat cannot be expected to thrive on 1 percent, as is the case when condensed milk is given; nor can he be expected to thrive when the use of a 6 percent cow's-milk fat mixture is long continued. Likewise very low proteid or very high proteid will be followed by malnutrition, the one producing indigestion and interference with the assimilative powers, the other supplying too little nutrition to the organism. In either event, the child does not get the nutrition required. The amount of proteid given in condensed milk is rarely above 0.5 percent. The proprietary meal foods and condensed milk mentioned elsewhere are useful in certain types of illness and in convalescence from illness. They must not, however, be selected as the sole articles of diet. A mistake frequently made in the feeding of these cases is to give the food at too frequent intervals. At the sixth month three-hour feedings, six in twenty-four hours, are best, even though the food is weak. The stomach will bear stronger food sooner when given at longer intervals than it will when given at intervals of two and one-half hours. When the child is nine or ten months of age, four-hour intervals usually answer best. In the underweight and delicate it may be necessary to continue with the three-hour feedings after the sixth month. Cow's milk should be the basis of the diet, given according to the suggestion in the section on Marasmus. In many cases cereal gruels made from barley or oatmeal may be added with advantage. Malt soup (page 109) may often be used with success in these patients. A milk formula below that indicated by the child's age may have to be given for a long time. Thus, when six months of age he may be able to take but a three-months' formula; when nine months of age, a six months' formula. I have constantly under my care infants who cannot take cow's-milk mixtures corresponding in strength to that usually taken by well infants of the same age.

Hygiene.—Attention to the matter of outdoor life, indoor airing on inclement days, and residence in the country during the heated term is of great importance in the general management. During the

cooler months the child should receive inunctions of unsalted lard or goose oil after the daily evening bath. Constipation, if present, is treated by the oil injection method (see page 185), or olive oil may be given by the mouth, one to two drams after two or more feedings each day. Besides being of decided benefit in relieving the constipation, it adds not a little to the nutrition of the patient.

TARDY MALNUTRITION

Malnutrition with tuberculosis and syphilis is not a part of our subject. In the sections on Malnutrition in Infants and Children it may be thought by some that there is repetition of what is said under the title of The Delicate Child. While the management necessarily is along the same lines, two distinct types of children are represented. The marasmic and malnutrition infant or young child may be but temporarily delicate. When the simple malnutrition case recovers it may develop into as normal a specimen of robust childhood as could be desired. The delicate child as I have endeavored to describe him is inherently delicate, and our efforts are toward improving his condition, with the hope perhaps, but with no great assurance, that he will some time become a robust adult. Tardy malnutrition is seen in children of the school-age. They are deficient in weight, in resistance to disease, and in capacity for work; they are pale, thin, tired children.

Etiology.—Cases of tardy malnutrition as well as those of marasmus and infantile malnutrition are seen in all the walks of life, among the wealthy, the so-called middle class, and among the poor. Strange as it may seem, these cases, regardless of the station in life, have one cause common to all—defective feeding. The scion of wealth who is overfed, or badly fed—given food which is unsuitable, and allowed the promiscuous use of sweets—may develop malnutrition just as effectively as the child of the tenement who subsists on fried meats, grocery milk, boxed breakfast foods, and other nondescript products of the bakery around the corner. There is a painful lack of knowledge among all classes as regards the nourishment required by a growing child. He is fed to satisfy his appetite, and when this is accomplished the parents believe that their duty is done. How far they fall short of proper feeding is demonstrated daily in out-patient clinics and in private work. Poverty is an occasional cause of bad feeding in New York City.

Treatment.—I have repeatedly seen children from five to ten years of age with marked malnutrition gain from three to five pounds the first month under treatment which consisted simply in giving food that they had a right to demand, properly prepared at definite intervals. The school-child suffering from malnutrition should be removed from school temporarily and as much outdoor life as possible should be enjoyed by him, regardless of his station in life. Everything of a strenuous nature should be avoided. He should be put to

bed early and encouraged to sleep late. A midday rest for one who shows marked emaciation and diminished resistance is advised.

Illustrative Case.—The following is quite a normal history of an advanced case of malnutrition in a girl seven years of age, and the treatment is that which we usually employ. The mother brought the girl to the out-patient service at the New York Polyclinic because the child was pale, did not grow, and was always tired—too tired to go to school, of which she was very fond, too tired to play with other children, as had previously been her custom. There was loss of appetite, no food being taken except on compulsion. Her weight was forty-one pounds, her appearance as above described. There was no evidence of congenital syphilis or tuberculosis. There was a secondary anemia. The child slept in a badly ventilated room, she drank tea and coffee. Cake, pastry, and sweets were her regular diet, and because she did not eat at meal-times she was allowed to eat between meals whenever and whatever she pleased. The following mode of life and diet was prescribed. She was to sleep in the front room, known as a sitting-room or parlor, with a window open at least six inches. She was given three meals a day with nothing whatever between meals. The diet consisted of red meat once a day, two or three soft-boiled eggs daily, one quart of good milk daily if it agreed, and it did agree. She was to have only natural cereals, such as oatmeal, cracked wheat, and cornmeal—each of which was to be cooked three hours the day before it was to be given. Baked or boiled potatoes and one green vegetable were to form a part of the dinner at midday. Stewed and raw fruits and plain puddings with home-made bread and plenty of butter completed the dietary. She was put to bed at 7 o'clock and arose at 7 the following morning. An after-dinner rest in a darkened room for an hour was insisted upon. Before retiring she was given a brine bath (page 31), followed by a brisk drying with a rough towel, after which her entire body was rubbed for ten minutes with olive oil. In one month a radical change had taken place. She had gained four pounds in weight. Her color was good. She complained no more of languor or fatigue. She was eager for school. The improvement continued, and in ten weeks she made a perfect recovery. In not every case will results be so prompt and satisfactory. In some, a longer time will be required before pronounced results are to be seen. Every child suffering from malnutrition of this type cannot help being benefited more or less by such a régime.

Tonics.—The tincture of nux vomica, four drops in water before meals, is sometimes given to these children in whom the appetite is defective; or one grain of the citrate of iron and quinin may be given in one dram of equal parts of sherry wine and water.

Constipation.—If constipation is present, the oil injection treatment (page 185) should be instituted, or olive oil may be given internally, two to three drams after meals. If the oil is not well taken or if it disagrees in any way, of course its use should be discontinued.

ESSENTIALS IN THE CARE OF ACUTE ILLNESS

Our first consideration in our relation with a sick child, regardless of the nature of the illness, is to appreciate the changed conditions which exist. A well child, regardless of the position he may occupy in the social scale, prescribes to a certain living régime, which is supposed to be so fashioned as to supply the requirements of nutrition and healthy growth, which means normal development. Thus, he is fed, clothed, he has the benefit of fresh air, exercise, and bathing. When the child becomes ill his position temporarily is changed, and in order for us to act to his best interest, his daily régime of living demands that radical changes be instituted in order to meet this changed condition as regards appetite, sleep, the digestive capacity, and quiet. The great majority of the serious illnesses in children are acute in character. Vitality and resistance determine in no small degree the issue of the disease. We must so act as to conserve every strength unit. Every child begins the illness with a definite number of strength units.

Our first duty, then, toward the sick child is to place him in the most favorable position, in order that he may be able to withstand the ordeal through which he must pass. Regardless of the nature of the disease in a child, there are certain requirements that must be carried out that apply to all severe illnesses, the general management of which in children is very similar.

Patient to Be Kept in Bed.—The patient is to be kept in bed, not held on the lap. The handling of the patient, the passing from one person to another, the attempt at entertaining, cause active excitement when quiet is necessary, and waste energy.

Quiet Attendants.—Attendants who are quiet and agreeable to the child should care for him. In my seriously sick cases—pneumonia, endocarditis, and the like—I allow but one person, and that the attendant, in the room at one time.

Clothing.—The clothing of the patient should be the usual night-clothing, that to which the child was accustomed in health. There is no illness that requires extra clothing for the body when the customary room temperature (66° to 68° F.) is allowed. Heavy shirts and oiled silk or cotton wool jackets are never employed, regardless of the nature of the illness.

In summer the lightest clothing should be used; in younger children a thin linen slip with the addition of a napkin is all that is required.

Sponging.—The patient is sponged over once or twice a day for cleansing purposes, regardless of the nature of the illness. During the hot days of summer the sponging may be repeated several times with advantage. There is no disease of childhood in which the application of water to the skin is a dangerous proceedure. On the contrary, it is quite necessary that the skin be so treated that it functionate actively.

The Sick Room.—In summer, a cool, quiet room, large if possible, with wide open windows or its equivalent out of doors, should be selected for the patient. During the colder months a generous air space is most desirable.

Room Temperature.—In winter the thermometer should never go above 70° F. Hot, ill-ventilated rooms depress the vital powers. The child is poisoned by carbonic dioxid; he is made restless and irritable. He uses up nerve force and energy is wasted. A room temperature of 66° to 68° F. is best under most conditions. There are few households which cannot have a thermometer.

Ventilation.—There must always be a communication between the sick room and out of doors. A convenient means of ventilation is in the use of the window board. A board from four to six inches wide is sawed so as to fit under the lower sash. This brings the two sashes apart at the top and allows a current of air to be directed upward.

Cold Air.—I am not inclined to advocate cold air to the extreme degree that is advised by some. A wide-open window during illness, such as convalescence from acute pulmonary disease, I consider an excellent measure if the child is suitably protected by a hood and an extra outer garment; when possible I give the patient the advantage of two rooms, one for use during the day and one for the night. This is of particular advantage in grippe and in the respiratory diseases in which there is a possibility of reinfection. The room which is not occupied should be aired continually.

Drinking of Water.—There is no illness of childhood in which water to drink should not be given freely. If there is any question as to its purity it should be boiled.

Diet.—The digestive capacity of every sick child is lessened. This we all appreciate; the degree of incapacity depending largely upon the severity and nature of the illness. In every illness the food strength should be lessened. This we do not all appreciate. In breast-fed babies this is done by giving the child water, sugar-water, or some cereal decoction, as barley-water, before each nursing, usually from two to three ounces. This dilutes the mother's milk. The nursing baby is satisfied when his stomach is full. He needs as much fluid as usual, but is unable to digest the usual amount of breast milk. In the bottle fed, the food strength is reduced by substituting water for a given quantity of the milk mixture. A safe rule to follow is to reduce

the food strength one-half by the addition of water. If the illness is very severe, one of intestinal disorder, whether typhoid fever or summer diarrhea, milk is discontinued absolutely and, usually, cereal decoctions substituted. During a very severe attack of pneumonia or scarlet fever, milk is also discontinued and cereal gruels given. If the absence of milk has to be continued for several days, milk-sugar is added to the cereal-water substitute so that it shall contain 5 per-cent of milk-sugar. This is obviously to supply fuel for the organism and spare the proteid tissue. When the usual feeding is continued gastro-intestinal infection and intestinal disease is sure to add to the burden of the patient through toxins absorbed from the putrefaction of undigested milk in the gut and through the resulting tympanites, which is a very serious feature in the respiratory and cardiac diseases. Tympanites embarrasses the action of the overworked or diseased heart and interferes with respiration already sufficiently obstructed by the processes in the lungs or in the pleural cavity. The carbohydrates leave no by-products to be eliminated by the kidneys, thus lessening the work of these diseased organs and perhaps preventing their involvement, in such diseases as scarlet fever and diphtheria, by diminishing the amount of irritation to which they may be subjected. In short, we must allow just as much food as the patient can care for. When we give more, we diminish the chances of recovery through added toxemias or by interfering with the vital processes.

Needless Interference.—Regardless of the nature of the severe illness, we must conserve vitality by disturbing the patient as little as possible. The various offices for the child should be done at distinct intervals, but make the intervals reasonably long. It is rare that a child will need food or medication oftener than once in two hours during the night, usually three hours answer in most cases. Food and medicine may be given at the same time. Not infrequently I see cases in consultation where something is being done to the child every hour in the twenty-four. This would exhaust any well child. What can the effect be upon the very ill but to diminish his chances of recovery?

Urine Examination.—Nephritis is a complication and a serious one, that may be looked for in all acute diseases of children. An early recognition of this complication is most important. Albumin in the urine is one of the earliest signs of nephritis, and involvement of the kidneys may be discovered by urine examinations before any of the other signs of nephritis appear. It is my custom in scarlet fever and diphtheria, diseases peculiarly liable to nephritic involvement, to examine the urine daily. In other acute diseases with fever, at two- or three-day intervals. This examination is simplified by writing a prescription for an ounce of c. p. nitric acid and a few test-tubes, which are kept in the sick room. The cold test is sufficient to detect

the smallest trace of albumin. When the physician must carry the urine with him or have it sent to his home, the examination is sometimes postponed or otherwise neglected.

Bowel Function.—Every nurse or mother is given a standing order that there is to be one evacuation of the bowels daily, and if this does not occur naturally, an enema is given.

Bowel Feeding.—In conditions of collapse in any illness, in coma and certain gastric disorders particularly, sufficient nutrition cannot be given by the stomach. When such a condition obtains, regardless of the illness we have to resort to colonic feeding (page 145).

Suppression of the Urine.—Suppression of the urine is not an unusual occurrence in pediatric practice and may occur in a wide range of diseases. One of our most successful means of combating this condition is in the use of colonic flushings (page 351).

Pyrexia.—High temperature in children, regardless of the nature of the illness, is to be managed by the same methods. The most satisfactory in my hands has been the abstraction of heat through the means of hydrotherapy, in the use of sponging and packs. It is a popular belief among laymen that cold should not be used in scarlet fever or measles because of some unfavorable influences excited on the rash. There is no disease of childhood with temperature in which the application of water to the skin does harm. I use spongings and packs in scarlet fever exactly the same as in pneumonia or typhoid fever.

When is elevation of the temperature to be interfered with? What are the indications that necessitate interference? When we have a degree of temperature that causes restlessness, loss of sleep, rapid heart with resulting loss of vitality—*i. e.*, wasted energy—then I believe that means for reduction should be instituted. This will be necessary in some patients at 103° F. In others at 105° F. In other words, we should be governed largely by the effects of the temperature upon the individual and not by the reading of the thermometer. If sponging is employed, I use one part alcohol with three parts of water at about 80° F. The skin is repeatedly moistened with the solution, which is allowed to evaporate. In some patients such a procedure is soothing. In others it occasions no little annoyance, in which event it must not be used. By far the most satisfactory hydrotherapeutic means is in the use of the pack (page 503).

Drugs.—Regardless of the nature of the disease, a full dose of castor oil cannot help but be of benefit at the beginning of the illness. Every child admitted into the Babies' Hospital of New York City gets two teaspoonfuls of castor oil and a bath.

In the use of drugs in children it is quite necessary to use them so that harm may not follow.

In any illness in a child one feature to bear in mind is to keep on good terms with the child's digestive tract. In our medication

we must seek to protect the stomach. This may be done by giving much of the medication after meals, using it in capsules, powder, or tablet by preference; it is to be given well diluted with water when administered between meals. When liquid medication is necessary, elixir simplex in small amount is employed as a flavoring medium. Avoid the useless syrups. The worst possible medication, to my mind, is the custom of using heavy syrups for flavoring measures. The practice of giving the ammonia salts and ipecac, usually with syrup of Tolu, to a child with severe bronchitis or bronchopneumonia is wretched practice, and this is putting it mildly.

Stimulation.—I have two criticisms of general application as relates to the management of sick children. The first is that heart stimulants are used too early and in too large dosage, and that antipyretic measures are resorted to when such management is not called for. I have already referred to the latter in stating that a child should not necessarily have antipyretic measures used because he has fever with his pneumonia or typhoid or scarlet fever. Neither does he require stimulation because he has typhoid or scarlet fever or pneumonia. Regardless of the nature of the illness, our choice of stimulants is very much the same and our reason for using them is exactly the same, in that we have a heart that needs help. Details as to the employment of heart stimulants and the drug used will be found under proper headings in the different chapters.

It will thus be seen from the foregoing that the treatment of different diseases of children has many features in common, and these essentials must be appreciated by every man in order that he do the best work in treating diseases of children.

If there is one thing that has been impressed upon me in an active life of twenty years in childrens' work, it is the necessity of the completeness of detail in our management of children. We little realize how sensitive the sick child is, how all nervous effort, all untoward influences cost something. They cost energy and output of vitality which may be sufficient to determine the issue for recovery or against it. Family co-operation is necessary for success, and will be best obtained through the confidence and affection engendered by thorough, painstaking work on the part of the physician.

GASTRO-ENTERIC DISEASES

ACUTE INTESTINAL INDIGESTION

This disorder is first referred to because, according to my observation, it is the most frequently seen of the intestinal disorders. Its importance not being recognized, it receives but little consideration in its bearing upon prophylaxis and treatment. The proper appreciation and management of a disordered intestinal function are essential to the solution of that most important problem—summer diarrhea. As pointed out elsewhere, the intestine which furnishes the most fertile field for bacterial growth is the intestine which is persistently deranged.

The mortality of summer diarrhea in June in Greater New York in children under two years of age is usually but from three hundred to five hundred less than in August. The high June mortality has been explained by the fact that it includes many cases of malnutrition and marasmus; but it must be remembered that it includes also cases of a diminished intestinal resistance, which are ready subjects for the almost invariable exposure to which every bottle-fed infant is subjected at some time during the summer, when heat and humidity aid in lowering the general vitality—exposure through infected food. A close investigation of hundreds of cases of severe acute disorders of infants has shown that a great majority of them are not as acute as a superficial history would indicate. A complete history in a case of acute gastro-enteric infection (cholera infantum) or in an apparently severe intestinal infection with resulting colitis, or in an acute colitis (dysentery), will show that the child had defective intestinal digestion during the previous cold months, and that the grave condition which he presented when brought for treatment had been preceded for two or more days by simple diarrhea, probably without vomiting and with little fever, but he did have green passages and he did have diarrhea. He therefore had intestinal indigestion before the urgent symptoms of fever and prostration developed. In about 1 percent of the cases of severe gastro-enteric diseases of children in summer the onset is sudden, without warning and with urgent symptoms.

Treatment.—The time to treat these cases of intestinal indigestion, in order to be most effective in the prevention of severe toxemia and grave lesions, is before the physician sees the patient. The reduction in the mortality rests in the education of the mother to the point of realizing that a loose green stool is a danger-signal. When it

occurs, she is to give a dose of castor oil, two teaspoonfuls, stop the bottle or stop the breast, and give the baby boiled water or barley-water until the physician can see the patient. Any physician who has children under his care, whether in hospital, institution, out-patient, or private practice, and who does not so instruct the nurse or mother, fails in his obligation as a practitioner of medicine.

In the Breast-fed.—Intestinal disease of severity in infants fed entirely on the breast is exceedingly rare. In a breast-fed baby it may be necessary to discontinue nursing for from twelve to thirty-six hours. The child is given one or two drams of castor oil and barley-water or rice-water No. 1 (see page 129), to which one-half or one-fourth ounce of cane-sugar is added to the pint. While nursing is discontinued the breasts should be pumped at the regular nursing hour so as to keep up the flow of milk and relieve the pressure. Rarely will other treatment be required.

In the Bottle-fed.—In the bottle-fed, greater caution will be necessary. The management consists in continuing the carbohydrate diet, which the well-trained mother has begun, until the stools approximate the normal, which may necessitate an abstinence from milk for three or four days, by which time it may usually be resumed. In resuming the milk it should always be given in reduced quantities for the first day. One-half ounce of skimmed milk may be added to every second feeding or to every feeding of the gruel. If it is well digested and causes no return of the diarrhea, the amount of milk may be increased tentatively every day or two by the addition of one-half ounce to each feeding.

PERSISTENT INTESTINAL INDIGESTION

A greater part of this subject has been covered in the consideration of the management of malnutrition and marasmus. It is again referred to here in order to call attention to those cases which, though mild in character, are so important an etiologic factor in the acute intestinal diseases of summer. There is perhaps not enough bowel disturbance to interfere with the nutrition, but we have learned that a considerable part of the summer mortality of acute intestinal diseases occurs in children who have a reduced intestinal resistance as a result of persistent intestinal indigestion.

A considerable number of infants do not have normal bowel evacuations even for two days out of ten. There is constipation which is neglected, or there is a passage of undigested or loose stools. In some cases constipation alternates with diarrhea. Occasionally there is a sharp attack of diarrhea with fever. In getting the history of our cases regardless of the nature of the illness, we often learn that, as a rule, the infants have undigested stools. There is always an unstable intestinal equilibrium. This condition of intestinal indigestion is almost without exception due to errors

in diet—either unsuitable articles of food being given habitually, or the food is too strong or the feeding intervals too short.

Treatment.—The management of each case is determined by the age of the patient and the conditions of the family, and will be discussed in the sections relating to Nutrition, Substitute Feeding, and Modification and Adaptation of Foods.

PERSISTENT INTESTINAL INDIGESTION IN OLDER CHILDREN

In such cases there may be a sufficient absorption of toxins of an unknown nature from the intestinal canal to produce a wide range of symptoms. Whether this causes pathologic conditions in other organs it is not possible to state. It is assumed, however, that it does. Comparatively little attention appears to have been given the subject. There is no doubt whatever that it is a factor of great importance in the nutritional and the so-called functional nervous disorders of childhood. One reason why little attention has been called to the intestinal tract as an etiologic factor is perhaps because the child is not necessarily constipated. Intestinal toxemia may exist with one or two apparently normal passages daily and even without the presence of indican in the urine.

In my cases the conditions in which it has seemed to play a part sufficient to form a symptom-complex have been habitual headache, disorders of speech, choreic in character, secondary anemia, habitual sleep-talking, sleep-walking, and general irritability without apparent cause. Well children are naturally bright and happy. When a child is persistently cross and irritable, he is not a well child. Chronic papular eczema has proved to be of intestinal origin in a considerable number of my cases, particularly among the out-patient class. The condition often regarded and treated as malaria is not infrequently due to intestinal toxemia. Fever of a degree or two may be present for protracted periods. Nearly every case which has come under my care had been given at some time or other a course of quinin. Such a patient is very apt to be habitually tired and languid. He may be fairly bright early in the day, but in the afternoon he yawns and complains of being tired and sleepy. The blood examination fails to reveal signs of malarial infection, and quinin in full doses furnishes no relief. The appetite may be satisfactory, the tongue may show no signs of digestive disorder. The symptom-complex which suggests to the mother the thought of worms is usually the manifestation of intestinal toxemia.

Illustrative Cases.—An interesting case of this nature came under my care a few years ago. The boy, aged three years, highly nervous and irritable, was afflicted with day terrors—*pavor diurnum.* The attention of the nurse was attracted to the condition by the boy, who asked that the "bugs" be removed from his lap-robe

when he was in his go-cart. It was in the middle of winter and there were no bugs present. I fortunately saw the boy on one of these occasions and asked him to pick up a bug, which he tried to do with his fingers. He could not understand why he could not catch them. In this child the tongue was heavily coated and there was moderate constipation, a laxative being required every third day. There was an excess of indican in the urine. The boy was taking a large amount of rich cow's milk daily. After stopping this, a full dose of rhubarb and soda was given daily and the boy was well in a week.

A boy five years old was brought to me because of disturbance of speech. He was normal until three and one-half years of age, when he had difficulty in the formation of entire words. This had increased with the development of other nervous phenomena. There was marked incoördination in speech—*dysarthria*—due to choreic movements evidently of the tongue and laryngeal muscles. The boy was exceptionally well nourished and there was an absence of choreic movements in other parts of the body. The knee reflexes were considerably increased. He was easily excited. Hard play was followed by restless nights, and he talked in his sleep every night, regardless of the habits of the day. Inquiry into the diet failed to elicit any grave errors. He drank one quart of milk daily, but milk had never agreed with him as an infant. The bowels moved once daily. The movements were often of foul odor and the mother stated that she was satisfied they were too small. The case after three weeks showed striking improvement on a non-milk diet with a daily laxative, and made a complete recovery in three months.

A third case seen was a girl six years of age who lived in the best surroundings in a country district. She was pale, rather thin, and below weight for her age. She was chronically tired and irritable and had been so for two years. Examination of the blood showed a secondary anemia, and of the urine a marked excess of indican. She had been taking quantities of quinin. There was no constipation, the child had an indifferent appetite. She favored milk and was paid for drinking extra quantities of it—about two quarts daily being taken. Marked improvement followed the treatment by an absence of milk from the diet and laxatives, after which she passed from my observation.

The condition of intestinal toxemia is probably due to changes taking place in the proteid content of the intestine. In the three cases mentioned, milk was a considerable part of the diet; in fact, in the majority of my cases, milk had been taken in considerable quantities.

Treatment.—In my experience the management of these cases, which has been most successful, has been the discontinuance of cow's milk, with the further dietetic suggestions of but one egg

every second day, and meat but once daily. Cereals, fruit, and vegetables are taken as suggested in the Dietary (page 134). The use of green vegetables is particularly encouraged. In place of cow's milk, malted milk is given, and to facilitate the bowel action, a raw apple is given in the middle of the afternoon. The patient takes an after-dinner rest for an hour or two. If constipation is obstinate, rhubarb and soda of the following strength are used:

℞. Pulveris rhei.....gr. iv
Sodii bicarbonatis.....gr. viij
Syrupi rhei aromatici.....℥ss
Aquæ .....q. s. ad ℥j
M. ft.
Sig.—One teaspoonful once or twice daily

Or, what I prefer, if the child can take a capsule, is the following for a child from five to eight years of age:

℞. Tincturæ belladonnæ.....gtt. ij
Tincturæ nucis vomicæ.....gtt. iv
Extracti cascaræ sagradæ.....gr. j–iij
Sodii bicarbonatis.....gr. iij
M. ft. capsula No. i.
Sig.—To be taken at bedtime.

The medication may be continued for three or four weeks, after which time one dram of the syrup of the hypophosphites (Gardner's) may be given three times a day. This may be alternated with:

℞. Ferri et ammonii citratis.....gr. xxiv
Elixiris simplicis.....℥j
Aquæ .....q. s. ad ℥iv
Sig.—One teaspoonful three times daily after meals.

In the event of constipation following the use of the laxative, the oil treatment (page 185) may be brought into use and continued until the condition is relieved.

COLIC

But few children complete their first year without having severe attacks of colic. In some cases the child thrives in spite of the attacks, in others such a grave degree of indigestion exists that the condition may prove most serious. The character of both human and cow's milk, its ready decomposition in the intestine, with the formation of gas, together with the lack of development of the infant's digestive apparatus, explain in no small degree the frequency of colic in the young. When cow's milk is used as in the bottle-fed, we are dealing with a substance foreign to the infant's digestive apparatus, and often colic is the outcome. Any condition that will give rise to indigestion may, of course, be a cause of colic. Those children that take too much milk, too strong milk, or who

take milk too frequently are the usual subjects of colic. Probably the most frequent cause of colic is an indigestion of the proteid of the milk. Either the proteid is in excess or the child has a poor proteid capacity. Not a few cases of colic are due secondarily to defective bowel action. A passage occurs each day, but in too small amount. There is a continual fecal residue in the intestine which undergoes decomposition with gas-formation. Cold feet are often associated with colic. Fright, anger, fatigue, excitement—any condition, in short, which may make a sufficiently unfavorable impression upon the child's nervous organism, may produce indigestion and colic.

Likewise any adverse nervous mental state in the mother may produce colic in the breast baby. Constipation in the mother is not an infrequent cause.

Treatment.—Repeatedly I have had under my care nursing babies who suffered from habitual colic and who recovered after the regulation of the mother's bowels by exercise, diet, and medication. In other breast cases in which the mother's milk upon repeated examination proves too strong and the child suffers daily from colic, a dilution of the milk may be made by the use of plain water or barley-water, from one-half ounce to one and one-half ounces of the diluent being given before each nursing. In addition to the above, the bowels of the colicky infant should move at least twice daily, morning and evening. When this does not take place readily a simple laxative, such as milk of magnesia, one-half to one teaspoonful, or ten to thirty drops of aromatic cascara sagrada, may be given daily. Under no condition should a child subject to colic, be allowed to go without a bowel evacuation for more than twenty-four hours.

Diet.—The dietetic management of colic in the bottle-fed consists in adapting the food to the child's digestive capacity. The bottle baby may have habitual colic moderately and thrive, but he does it on an imperfectly adapted food. Here, as in the breast-fed, the condition is usually dependent upon an excessive casein supply or a diminished casein capacity. The matter of the adjustment of cow's-milk proteid in indigestion is discussed in detail under Milk Adaptation (page 106). It is sufficient to say that the colicky bottle baby should have long intervals between feedings—usually one-half hour longer than otherwise allowed. Digestion is slower in many of these cases, although in other respects they may be healthy children. In some the indigestion and pain are so severe that a perfect adaptation of cow's milk is impossible, and some other food than cow's milk will be required.

Enemas.—The prevention of colic, then, it will be seen, rests upon a proper adjustment of the food. The immediate attack is usually best relieved by the use of an enema at 110° F. of a normal

salt solution or of soapsuds, which, by inducing a movement of the bowels, allows the gas to escape.

Medication.—A soda mint tablet dissolved in one ounce of hot water, given in one-teaspoonful doses repeated at five-minute intervals, is sometimes successful. For a child under one year of age three drops of spts. ætheris comp. (Hoffman's anodyne) may be given in two teaspoonfuls of hot water and repeated at ten-minute intervals. From five to ten drops of gin, when given in three teaspoonfuls of hot water, may be used, and repeated in from ten to fifteen minutes if the attack continues.

Hot Applications.—Hot applications to the abdomen are often grateful to the patient. For this purpose ten drops of turpentine in one quart of water at 120° F. may be used with benefit. A flannel is wrung out of the water or the solution and applied over the abdomen and covered with a dry piece of flannel. The dressing may be changed every ten or fifteen minutes.

Opium and its derivatives should not be used in the treatment of colic. It may relieve the pain temporarily, but it aggravates the condition to which the colic is due.

BOWEL FUNCTION

In order to keep the infant or young child in good physical condition, one free evacuation of the bowels is required once in twenty-four hours. While two or three evacuations daily in a nursing or bottle baby may be desirable, this number is not absolutely necessary. When there are more than four passages in twenty-four hours, it means that something is wrong with the intestinal tract. This, however, may not be of such a nature as to require radical means for its correction. Thus, in many nursing babies who are supplied with a high-fat breast-milk there may be several thin greenish stools in twenty-four hours, in spite of which condition the child thrives satisfactorily. It is well in these cases to attempt to reduce the fat in the breast-milk by measures suggested elsewhere, but by no means should the nursing be interdicted if the baby is making a reasonable gain in weight. The proof of successful nursing is a thriving child, not the character of the stool. The habit of an evacuation at a certain time each day is one of the most important preventives of constipation in an infant. There is a standing order in every household where I have such a patient, to the effect that the child is never to be put to bed for the night unless the bowels have moved during the preceding twenty-four hours. Either a simple soap-and-water enema or a small glycerin suppository is employed. The enema is preferred, from four to eight ounces of the soap-water being used. The suppository is used only when, for any good reason, the enema is not available. Placing the child at stool immediately after the morning bottle is one of the means

of establishing the habit of an evacuation at a definite time each day. The child soon appreciates the reason for this position and acts accordingly. This practice may be begun when the child is five or six months of age.

Defective Bowel Evacuation.—Defective bowel evacuation in infants and young children is a form of constipation very apt to be overlooked, and for this reason it is put under an independent heading. As long as an evacuation takes place daily it is supposed to be sufficient. Even though a passage takes place daily and voluntarily, if it is dry and comes away in pieces or in hard balls, or is firmly formed without the moist surfaces caused by the presence of mucus and water, it is practically certain that the evacuation is not complete and that fecal matter is retained in the intestine. This may occur at any age, and when the condition persists, there results, oftentimes, an intestinal toxemia, with the manifestations referred to under that caption (page 202). The same methods of treatment are to be followed as suggested in the preceding chapters on constipation for the various ages of infancy and childhood. Usually, however, in this type of constipation, dietetic measures are sufficient.

Constipation in Nurslings.—There are many nursing infants, who are thriving and well in every respect, except that they are constipated. There is greatly delayed or no bowel evacuation without aid. Our first step in the management of these cases is to examine into the daily life and habits of the mother. A factor in the etiology of constipation in the infant is constipation in the mother, which, if relieved by diet or medication, will often relieve the child; or if not relieved, the subsequent treatment directed toward the child will be much less effective. Nursing women who drink a great deal of tea are apt to be constipated, and their infants likewise. The nurslings of mothers who lead indolent lives, taking but little exercise, are likewise sufferers from constipation.

Treatment of the Mother.—Errors in the mother's diet and habits of life must be corrected and the scheme carried out which is recommended on page 69.

Having established a proper régime for the mother, the breast-milk should be examined (page 64). While high proteid may mean constipation, it is rare, in my observation, to find this a cause. Low fat, from 1.5 to 2.5 percent, with normal proteid is much oftener found to be present in these cases.

Often in such cases the fat in the mother's milk may be increased by the use of some form of alcohol, given with the meals. Wine, beer, ale, porter, or the liquid malt preparations may be given, the mother being allowed to make her own selection according to her taste. The free eating of red meats also increases the fat in the milk.

Several years ago a series of observations were made in the New York Infant Asylum relating to the effects of diet on breast-milk.

It was found that in some cases the fat could be increased from 1 to 2 percent by the addition of alcohol to the mother's diet. The value of the various galactagogs on the market depends, in all probability, upon the alcohol which they contain.

Treatment of the Child.—From the standpoint of nutrition and as a laxative, a valuable addition to the diet of the constipated breast-fed infant, when the mother's milk is found weak in fat, is cow's-milk cream, one-half to one teaspoonful being given before every second nursing or before every nursing, according to the age of the child and his capacity for fat digestion. Children during the early months of life take pure cod-liver oil readily, which, like cream, may serve the double function of a food and a laxative. Establishing by careful instruction the habit of an evacuation of the bowels at a certain time every day, is a valuable measure in all children.

Drugs.—Drug-giving is rarely necessary in young children and should be resorted to only when other measures fail. In case drugs are necessary, those most useful ordinarily are the preparations of cascara sagrada. The aromatic fluid extract (Parke, Davis & Co.) is palatable and may be given in sufficient doses to be effective once or twice daily. The milk of magnesia with equal parts of the aromatic syrup of rhubarb, given in doses of from one to three teaspoonfuls daily, is an agreeable and usually an effective combination.

Enemata and Suppositories.—The use of water enemata and suppositories is not to be advised as a routine measure. The habit of depending upon them is readily established, the parts by their frequent use become insensitive to stimulation, and in a few weeks they fail to act. I have had many mothers come to me for the first time in great distress when this stage was reached. When the stool is dry and hard and is passed with difficulty, the injection of two ounces of warm sweet oil at bedtime is of advantage. This is not with the idea of producing an immediate evacuation, but rather to act as a lubricant for the evacuation expected the following morning.

Malted Foods.—It is elsewhere advised that the nursing baby be given one bottle-feeding daily. The malted proprietary foods are distinctly laxative to many children. It has long been my custom, when in a nursing infant a condition of constipation exists which is not relieved by careful regulation of the mother's diet, to prescribe one feeding of malted milk daily, the food being given usually in the strength of one teaspoonful to an ounce of water. Some children will not take it in this strength, as the sweet taste is objectionable. In such cases it may be given weaker at the beginning, or it may be given in a milk mixture suitable to the age of the child; but when used in this way, there should be no addition of

sugar. Malted milk or Mellin's food may be used in a quantity equal to that of the sugar.

Massage is a most valuable means of treatment in the constipation of older children, but in nurslings and in the bottle-fed of tender age, on account of the restlessness and crying, it is not generally practicable, and to be effective it requires that it should be given only by those skilled in its use; therefore, unless the case is an extreme one, and all other measures have failed, massage is not to be employed in the very young. I have never seen any benefit from the abdominal manipulations attempted by the mother or nurse.

Treatment of Constipation in the Bottle-fed.—In the bottle-fed, inactivity of the bowel is more easily managed than in the nursling, because in the former we are in a better position to adapt the food to the child's digestive peculiarities. As a rule, constipated bottle babies should have a reasonably high fat—3.5 to 4 percent—and sugar up to at least 7 percent, but, as with all rules, this one is open to exceptions, a few of the most obstinate cases of constipation that have come under my care being those fed on a very high fat, the constipation being due to fat indigestion. It is extremely rare to find a child who can digest, day after day, a milk mixture containing more than 4 percent of cow's-milk fat.

The Proteid.—Cow's-milk casein is probably the most fruitful factor in causing constipation in bottle-fed babies, nevertheless it is necessary for the child's nutrition. A considerable reduction, such as may be obtained by giving a mixture of cream, sugar, and water, may relieve the constipation, but the child suffers from a nutritional standpoint, and instead of having a constipated baby to deal with we have a rachitic one, which is much worse. In not a few instances I have seen malnutrition result from cutting down the proteid, in the effort to relieve constipation.

The child's growth and development should most concern us in our relations with him, and this should never be subservient to anything else. A child under six months of age will not thrive satisfactorily on less than 1 percent of proteid as found in cow's milk. He is entitled to at least 1.5 percent, and thrives best when this amount is given. The relief of the constipation can in almost every instance be accomplished by other means than a too great reduction in the casein—the most nutritive element in the infant's food.

Milk given constipated infants should always be raw, as cooking increases its constipating tendency.

Laxative Agents in the Food.—The simplest means of treating constipation in the bottle-fed is by the employment of a laxative agent in the food, and when such an agent adds to its nutritive value, it serves a double purpose. Instead of using water as a diluent, oatmeal-water No. 1 (see Formulary) may be employed.

The malted proprietary foods, such as Mellin's food, and malted milk are laxative to most children. Mellin's food is composed largely of sugar, and therefore it may be used in place of sugar-of-milk or cane-sugar in the food mixture, and has thus served me well in relieving constipation. In some instances I substitute a feeding of malted milk once daily for the regular milk food, with from four to eight ounces of water, the quantity and strength depending, of course, upon the age of the child.

Drugs and Local Measures.—Dietetic measures should always be tried before drugs are resorted to, for when drugs are used, we have to give them in constantly increasing doses, and they soon become ineffective. One or two teaspoonfuls of milk of magnesia in one bottle daily may be recommended as a temporary expedient in some cases. The magnesia may be of service until the condition is controlled by the diet. The aromatic fluidextract of cascara sagrada, in doses of from fifteen drops to one dram, may be tried if success does not follow the use of the magnesia.

Water enemata and suppositories should be used only as temporary measures. Orange-juice, two teaspoonfuls, twice daily before feedings, is worthy of trial and is of antiscorbutic value in children artificially fed. Sweet oil and the pure cod-liver oil may also be used in doses from thirty drops to two drams, three times daily, after feedings, if the patient shows a tendency to rachitis or to general malnutrition. In the use of the oils, we have their beneficial effects not only as laxatives but also as aids to nutrition.

Oil Injections.—In case the stool remains hard and dry, in spite of the above suggestions, an injection of two ounces of warm sweet oil (page 185) may be given at bedtime every night, not with a view of inducing a passage at the time, but as a lubricant to the parts and as a solvent of the hard fecal masses.

Constipation in Older Children.—*Etiology.*—Probably the most potent dietetic factor in causing constipation in children of the "runabout" age is the use of full milk. Particularly is this apt to be the case if the milk is boiled. Constipation may be occasioned, further, by a too great concentration of the food, insufficient volume being furnished to produce copious evacuations.

Local Causes.—In a great majority of children the freer feeding following weaning from the breast and bottle relieves the tendency to constipation from which many children suffer during the earlier months of life. In a small percentage of cases, however, such relief is not furnished, and the child will require the attention of a physician. In making the physical examination of a case of this nature, special care should be directed toward the examination of the rectum, in order that local causes, such as fissures or hemorrhoids, may be eliminated. If fissures are present, the child will use every effort to prevent a bowel movement.

Regular Habits.—As a rule, children who are presented for treatment after the second year have not had the benefit of carefully regulated habits of life, so that our first step is to correct bad habits, that may have a bearing on the condition, and to teach good ones. The desirability of establishing in the child the habit of a bowel evacuation at a certain definite time every day should be impressed upon the mother or nurse. In order to bring this about, an attempt should be made to induce a movement of the bowels by voluntary effort every morning after breakfast. Not a few children are too busy, too active in their play, to respond to the call of nature when it comes, and if it can be repressed, they say nothing about it. If a certain time of the day is selected for the evacuation, and if they have to remain at stool until it occurs naturally, or by means of a suppository after fifteen minutes have elapsed, much is accomplished by this means alone toward establishing the habit.

Diet.—Ultimately, much may be accomplished in these cases by diet. Foods other than milk may now be given, so that a high-proteid milk, a milk rich in casein, is not necessary. As it is desirable to continue the use of milk at this age, the following combination of top milk and water may be used instead of full milk. A quart bottle of cow's milk is allowed to stand at a temperature of between 40° and 50° F. for five hours, when the top ten ounces are removed. The skimming is best done with a Chapin dipper (see Fig. 12, page 94). The ten ounces of top milk are mixed with twenty ounces of oatmeal gruel or plain boiled water and given as a drink.

The giving of high-fat mixtures in constipation is sometimes overdone even in older children. We seldom find a child five years of age who can digest, day after day, a milk or cream mixture containing over 4 percent of fat. Attacks of acute indigestion and faulty nutrition are very apt to result when too high a fat is persistently given. In not a few instances I have seen grave malnutrition result from an attempt to relieve the constipation by high-fat feeding. It must also be remembered that high-fat mixtures may produce constipation in children of any age, hard, very light colored, usually foul-smelling stools resulting. By using the top milk, diluted, we give a sufficient amount of fat and relieve the constipation by removing a considerable percentage of the casein, the usual constipating element, the percentage of which in the thirty ounces of food, above referred to, is but one-third that in full milk. Of course, the nutritive value of the dilution is less than that of full milk, but the child is now at an age when proteid can be given in other forms than in the milk.

White wheaten bread, wheaten flour crackers, with full raw milk should form no part of the dietary of our patients. It is best to give to parents of children we are treating for constipation a list of per-

missible articles of food from which they are instructed to make up suitable meals. The following articles of diet may be allowed:

Animal broths, purées of peas, beans, and lentils.
Rare roast beef.
Rare steak.
Hashed chicken.
Lamb chops.
Soft-boiled eggs.

Green vegetables, such as:

Peas.
String-beans.
Spinach.
Asparagus.
Strained stewed tomatoes.
Cauliflower, mashed.

Cereals, as follows (each cooked for three hours):

Cracked wheat.
Oatmeal.
Hominy.
Cornmeal.

The cereals may be served with a small amount of milk and sugar, or better with butter and sugar.

Bran biscuits.
Oatmeal crackers.
Graham wafers.
Zwieback.
Whole wheaten bread.

Desserts:

Stewed or baked apple.
Stewed prunes.
Custard.
Cornstarch.
Plain vanilla ice-cream.
Junket.

Malted milk may be given as a drink. Six teaspoonfuls of malted milk in eight ounces of hot water may be given once or twice daily. An agreeable change in taste of the malted milk may be made by the addition of a teaspoonful of cocoa. If milk is given as a drink, the top ten ounces from a quart bottle should be used as described above, mixed with twenty ounces of boiled water or oat-meal jelly.

A child in fair health after the second year usually thrives best on three meals daily. If he is delicate or if a fourth meal does not interfere with the appetite for the other meals, it may be allowed. The extra meal, however, should be light, and is best given at from 2 to 3 o'clock in the afternoon. For a child suffering from constipation, it may consist of a cup of broth with a graham or oatmeal cracker. Orange-juice or a scraped raw apple may also be given at this time. When only three meals are allowed, the orange-juice or scraped apple should be given in the afternoon about two hours before the evening meal. The giving of the fruit-juice or the apple on an empty stomach is a valuable aid in relieving chronic constipation. These patients should also be encouraged to eat plenty of butter. The use of olive oil internally is of as much service here as in bottle or nursing babies; from two to three teaspoonfuls are given

after each meal. It is usually well borne by the stomach; in fact, many children become very fond of it. Inasmuch as it is more of the nature of a food than a medicine, its use may be continued for months if necessary.

Treatment after the Fifth Year.—Permissible articles for a child of from five to ten years of age include those mentioned above, with the addition of dates, figs, raw and cooked fruits, baked and stewed potatoes, meats, baked and broiled poultry, and fish. The latter should be served plain without sauce. Plain puddings may also be allowed. One or two raw apples, an orange or a large peach or pear, should be given every afternoon. It is not promised that in a case of chronic constipation the above diet will at once produce normal bowel movements. The diet must be continued for weeks in some cases before marked benefit will be observed; in others the results are very prompt and satisfactory. Enemata and suppositories will be necessary at first until the habit of an evacuation of the bowels at a certain time every day is established.

Drugs.—Drugs also may be of temporary service. The cascara preparations are the best that we possess for this condition. If the child can swallow a pill or a tablet, the drug may be given in this form. The one-grain tablets of cascara may be ordered and the nurse instructed to give from one to three or four at bedtime. If the drug has been properly prepared from the well-seasoned bark, with a reasonable dose, there will be no griping, and the amount given on succeeding nights may be diminished instead of increased, as is often necessary with many other laxatives. Its use should not be continued longer than two weeks. If the daily evacuation habit is not established at that time, it will not be formed by further drugging. If the pill or tablet cannot be swallowed, then the aromatic fluidextract of cascara in doses of from one-half dram to one dram may be given. Castor oil, calomel, or podophyllin should never be given without other indications than simple constipation. In the cases in which the stools are soft when passed, but difficult of passage because of deficient peristalsis, the tinctures of nux vomica and belladonna may be given with benefit, if continued for a considerable time. A child three years of age may be given three drops of the tincture of nux vomica and two drops of the tincture of belladonna three times daily in pill, capsule, or liquid form. The constipation which accompanies mucous colitis is referred to under that heading.

Treatment of Obstinate Constipation.—Despite both diet and drugs, we meet at infrequent intervals cases which, without structural deformity, resist our every effort. Drugs, attempts at habit-forming, and diet have been used and failed until only the most radical measures along these lines furnish relief. In such cases of obstinate constipation, I use the following means of management. Laxative drugs are not given.

Diet.—Milk and cream are prohibited except in sufficient amount

to make the morning and evening cereal palatable. For this purpose not over two ounces of milk are needed. I prefer that cereals be taken with butter and sugar. Aside from practically cutting off milk from the diet, the dietetic measures are the same as mentioned above.

Oil Injections.—For this purpose a soft-bulb syringe of four ounces capacity is ordered. Over the hard-rubber tip is placed a small sized adult rectal tube or a No. 18 American catheter. The catheter or tube is cut so that but nine inches remain for use. The cut end is forced over the small hard-rubber tip of the syringe (Fig. 19). A fountain syringe is impracticable for this purpose, as it is soon destroyed by the oil and rendered unfit for use. Besides, sufficient pressure is not produced to force the oil into the gut even with a high elevation of the bag. The child is placed on his back or on his left side, preferably in the Sims position. The syringe is filled with oil, the tube is lubri-

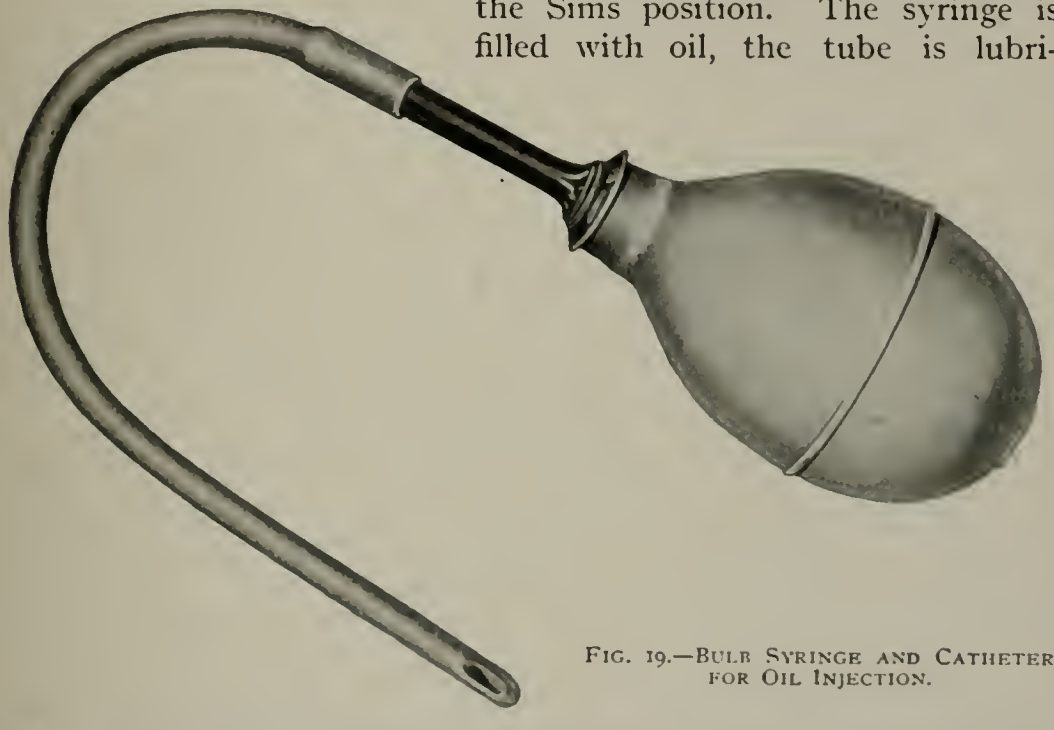


FIG. 19.—BULB SYRINGE AND CATHETER FOR OIL INJECTION.

cated, and passed through the rectum on into the descending colon. When it has been passed to the full nine inches, as may readily be done with a little practice, the syringe is emptied and the tube withdrawn. The injection should be given after the child has been placed in bed for the night. It is our object to have the oil retained during the night. If a passage of the bowels is produced at the time, or if the oil leaks out during the night, a smaller quantity should be used. In some of my patients I have been able to use but one ounce. In very few, indeed, does it cause an evacuation at the time. If there is a tendency to leakage a napkin should be worn to avoid soiling the bed-linen. If the oil is simply placed beyond the internal sphincter, it will rarely be retained during the night, or if retained, the results are by no means as good as when it is placed in the descending colon. The following

morning, after breakfast, the child is placed on the vessel and kept there until a bowel movement results or until fifteen minutes have elapsed. In a great many cases in which the constipation has been obstinate for months, the bowel will at once be evacuated. When this does not occur in fifteen minutes, a glycerin suppository is inserted, which invariably produces an evacuation. This use of the suppository, according to my observation, can usually be dispensed with in a very few days; the use of the oil, however, may have to be continued for several weeks. When the child has had the oil nightly and an evacuation the next morning without assistance for two weeks, I direct that the oil be omitted for a night and the effect noted. If the usual passage occurs after breakfast, the oil is given for five nights and then again omitted. If the case progresses satisfactorily the use of the oil is gradually omitted, being given at first every second night, then every third, fourth, or fifth night, etc. A considerable number of cases have been completely relieved in two months. In the event of no passage following the omission of the oil, its use is continued for two weeks longer, when it is again omitted for a night. To illustrate this point the following case is cited:

Illustrative Case.—A boy three years of age had never had a bowel evacuation without drugs, soap enemas, or suppositories since birth, and finally these were no longer effective. The mother, thoroughly frightened, brought the child to me. Eight months of diet and the use of the oil were required before he was entirely well. It is now three months since the local treatment was discontinued and the bowel function remains normal.

The diet with the absence of milk must be continued for months after the patient is apparently well, and he must not be allowed to pass a single morning without an evacuation at the usual time. In assuming the management of one of these cases I explain to the mother or nurse that the treatment is not pleasant for the child or the attendant, and that it may have to be persisted in for weeks, and unless she is willing to carry it out to the end, it would better not be undertaken. I assure her, however, that with her coöperation, which is usually readily given, the child will make a complete recovery. Cases that are slow in responding to treatment, I usually give the additional advantage of abdominal massage from twenty minutes to one-half hour, before the child is placed at stool. The massage should be practised by one skilled in the work.

The above local measures apply particularly to children after the eighteenth month. They may be used earlier, however, following out the diet along the lines laid down for bottle-fed children who suffer from constipation. In very young children a smaller amount of oil should be used, never more than two ounces, usually one ounce is all that is required. When the oil treatment is under way, whatever the age of the patient, laxative drugs should not be given.

VOMITING

While vomiting does not constitute a disease in itself, it is a condition of such frequency in children, and occurs in such widely varying circumstances, that any work relating to diseases of children would be incomplete without its consideration.

The most frequent causes of vomiting depend solely upon the functions of the stomach. When the stomach is overfilled, vomiting may result. When substances sufficiently irritating come in contact with its lining mucous membrane, whether they are swallowed as such or whether produced by some process of fermentation or by some other change in the stomach contents, they are ejected. When there is an involvement of an inflammatory nature of the mucous membrane of the stomach, whether acute or chronic in character, the stomach becomes intolerant of the blandest of fluids. Another condition involving the structure ofthe stomach, but only occasionally seen in children, is ulceration, which is usually multiple. I have made autopsies upon four such cases. In them, vomiting was the prominent, in fact the only, symptom.

Dilatation of the Stomach.—In this condition the food does not pass into the intestine but remains in the stomach and undergoes changes which produce sufficient irritation to cause vomiting.

Pyloric Stenosis.—In pyloric stenosis the food is prevented by the narrow pyloric opening from passing into the intestine; one feeding follows another, the stomach becomes overloaded, and, by reason of fermentative change in the residue, sufficient irritation is produced, in connection with the spasmodic contractions of the stomach peculiar to the condition, to induce vomiting.

Causes Remote from the Stomach.—In intestinal obstruction, whether due to intussusception, volvulus, peritonitis, or impacted feces, vomiting is an invariable accompaniment, continuing at irregular intervals until the obstruction is relieved or until the child dies.

The Acute Infectious Diseases.—The exanthemata and lobar pneumonia are very apt to be ushered in by vomiting if the onset is sudden and intense. In appendicitis in children, vomiting is usually one of the early symptoms; so also in the different forms of meningitis, vomiting is often an early symptom, and may continue persistently during the first few days of the illness. In nephritis, with uremia, vomiting is usually present. Vomiting may be caused by fright, by shock, or by a strain of any nature, as in whooping-cough, or it may be of a purely nervous origin.

Illustrative Case.—A few years ago I had a most unusual and interesting case. The patient was a girl four years old, pale and thin. The history was that of vomiting for more than a year, which had begun with rather a protracted, badly managed attack of indigestion. At first there would be but one or two attacks a day. Later they

became more frequent, and for a few weeks before coming to me, the vomiting had occurred at the table with nearly every meal, before the meal was completed. The mother was most anxious and apprehensive regarding the child's condition. She was always with her, always fed her, and always worried constantly throughout the meal, fearing an attack of vomiting. Using the most thorough means of examination of the stomach, I failed to find anything wrong with it. After observing the case for some days it occurred to me that the presence of the apprehensive mother, in whose mind the condition of the child and the vomiting were uppermost, might be a factor in causing the vomiting. I accordingly directed that the child take her meals in the kitchen with the maid, and that the matter of vomiting should not be mentioned. The mother was directed not to come in contact with the child in any way during the meal. I was much gratified and not a little surprised when the vomiting promptly ceased. After a few months of dining with the maid the latter was taken ill, and the mother for one day attended to the feeding. Again the child vomited as before.

The management of the different types of vomiting will be referred to in the consideration of the various diseases with which it is associated.

ACUTE GASTRITIS AND ACUTE GASTRIC INDIGESTION

Not a little confusion exists as to the differentiation of acute gastritis and acute gastric indigestion. Cases of gastric indigestion are often diagnosed as gastritis. In fact, acute gastritis in children is a very rare condition, while acute gastric indigestion is very common. Acute gastritis in the young is usually due to the ingestion of drugs, corrosive or irritant in character. Food given, unsuitable in character or quantity, or food which may have undergone chemical or bacterial change, may produce pronounced vomiting, usually transient in character. Inflammation of the mucous membrane of the stomach may be produced in this way, but according to autopsy findings it is most unusual. Acute gastric indigestion is manifested in sudden repeated vomiting, often with fever, and always with prostration.

Cases of persistent vomiting which are often diagnosed as gastritis not infrequently prove to be of cerebral or uremic origin, or they are due to some form of intestinal obstruction.

Autopsies on infants dying from acute gastro-enteric diseases, such as cholera infantum, rarely show any stomach lesion, although there may have been persistent vomiting for two or three days.

Treatment.—A high enema should always be given as the initial treatment in any illness of any nature in which there is acute vomiting with an absence of free bowel action. If the vomiting is continued, the management of the case, regardless of the exciting

cause, is to wash out the stomach at least once and to give no food by mouth. If the case is of more than twelve hours' duration in infants and twenty-four hours' in older children, colon flushings should be carried out to supply fluids to the organism (page 210).

Diet.—After twelve or twenty-four hours' abstinence from food, small quantities of water may be given tentatively, if the child craves it, or some very weak food. Whey, milk, barley-water, weak tea, chicken or mutton broth, may be tried in teaspoonful doses every half hour. Usually cold foods will be retained better than those that are heated. If the food or water is rejected a further stomach rest of from eight to twelve hours may be ordered, before the feeding is resumed.

Treatment of Protracted Cases.—In the protracted cases the stomach should be washed, at least once daily, with a 5 percent solution of bicarbonate of soda. It is never wise, in the event of vomiting, to attempt forced feeding, as nothing will be gained; in fact, the vomiting may be continued indefinitely, and chronic gastric indigestion established, as a result of injudicious attempts at feeding. For the persistent vomiting of infants, gavage (page 141) may also be used. I have employed this successfully in a great many cases of persistent gastric indigestion with vomiting. A food which is rejected when swallowed, will oftentimes be retained when put into the stomach through a tube. If nourishment cannot be retained after thirty-six hours, when given by the natural method or by gavage, it is best to begin feeding by the bowel, using completely peptonized milk, at intervals of from six to eight hours, in quantities of from two to four ounces for young infants and from six to twelve ounces for children from eight to ten years of age. Applications of heat or counter-irritation over the stomach area have been of very little service. I have used mustard leaves from time to time, but have never been impressed with their value. *Drugs* were better omitted. I have treated hundreds of these cases of acute indigestion with different means of medication, including calomel, small doses of ipecac, oxalate of cerium, opium, etc., and have been far more impressed with their uselessness than with their beneficial influence. Drugs oftentimes get credit to which they are not entitled for the improvement of the patient. A child has an acute attack of indigestion with repeated vomiting. He is, perhaps, given an enema, his food is stopped, a certain drug is given in small quantities of water, and he recovers, and the drug gets the credit. He probably would have recovered more quickly without the drug. As a rule, drugs, or even the use of a small quantity of water, when given early, will prolong the attack.

An enema, the recumbent position, and abstinence from food, with fluids such as normal salt solution, or nourishment by the bowel, have given me my best results. When the child craves food,

and asks for water after an abstinence of several hours, it may be tried, but the fact that he asks for it is by no means a guarantee that it will be retained.

Treatment of Persistent Vomiting.—In pronounced, persistent vomiting, morphin hypodermatically may be required. The morphin should be guarded by atropin and given in doses of $\frac{1}{50}$ to $\frac{1}{40}$ grain for a child one year old, to $\frac{1}{10}$ of a grain for a child of from eight to twelve years old. The relation of the dose of morphin to that of the atropin should be as 1 to $\frac{1}{200}$. Thus, a child who is given $\frac{1}{30}$ grain morphin should have combined with it $\frac{1}{6000}$ grain atropin; with $\frac{1}{10}$ grain morphin there should be $\frac{1}{2000}$ grain atropin.

It will rarely be necessary to repeat the morphin more than once, two injections being given at intervals of from four to six hours. In all cases the usual feedings must gradually be resumed. After trying different foods it will soon be learned which will best be retained.

CHRONIC GASTRIC INDIGESTION; CHRONIC GASTRITIS

Chronic gastritis is seen most frequently in comparatively young children, and is often associated with, or is a cause of, marasmus and malnutrition. Vomiting and regurgitation of food are the predominant acute manifestations of the disorder. The condition is almost invariably a result of slight but persistent errors in feeding—errors too small to make the child violently ill, but sufficient to keep the stomach in a constant state of unrest.

Treatment.—The management consists in daily stomach-washings, sometimes for a long period, and an adaptation of the food to the child's digestive capacity (page 106). While there is no one way of feeding these cases, a food of greatly reduced strength must always be given, particularly when cow's milk is used. As a rule, these children have a low-fat capacity; not more than 1.5 percent can usually be taken. Sugar is also badly borne by many of these infants and must be given in reduced strength—from 3 to 4 percent only. Usually the proteids are fairly well taken care of if the function of the stomach is not compromised by too much fat and sugar. In children under nine months of age, a wet-nurse may help solve the problem. In beginning with the wet-nurse, however, the child should not be allowed to get over one or two ounces at a nursing, lest the fat in the milk continue the trouble. The remainder of the feeding is given by the bottle. Granum-water or barley-water No. 1 (see page 129) may be used in quantity sufficient to bring up the amount to the number of ounces required.

Dilatation of the stomach is usually present and motor inactivity necessitates stomach-washing, which may be required for several months at gradually increasing intervals. Details of the treatment, which are largely matters of feeding, would necessitate a repetition

of what has been said in the chapter on Malnutrition, Marasmus, and Food Adaptation, to which the reader is referred.

LAVAGE—STOMACH-WASHING

To Seibert, of New York, is due the credit of first calling attention in this country to the value of stomach-washing. Its use was soon appreciated by pediatricians generally, and at the present time it is an indispensable therapeutic measure with those who are actively engaged in children's hospitals, in out-patient or in private work among children. In the vomiting of children, whether due to an acute gastro-enteric infection, a chronic indigestion, or a subacute attack of chronic gastritis, it is equally valuable. The dangers of stomach-washing can be said to be practically *nil*. A colleague a few years ago, while washing the stomach of a child two years of age, turned away for a moment, when suddenly the struggling child disconnected the tube from the glass connecting-rod and swallowed it. Attempts at its removal through the bowel were unsuccessful; gastrostomy was performed, the tube removed, and the child recovered. This is the only accident of any kind I have ever known during stomach-washing.

The Operation.—For lavage, the child is easiest handled when its arms are pinned to its sides by a towel passing around the body. It may rest on its back in a crib, or sit upright on the lap of the nurse or mother (Fig. 20). The clean left index-finger of the physician is placed upon the base of the patient's tongue. The tube, moistened with the fluid to be used in the washing, not with oil, is passed down over the base of the tongue into the esophagus. It is practically impossible to pass it into the larynx. I have washed the stomachs of many hundred children and the introduction of the tube has never been attended with difficulty. When the tube has entered the esophagus, it should be passed rapidly into the stomach. At least nine inches of the tube will be required to reach the lower portion of the stomach. At first the child will cough, retch, and become red in the face, but this need cause no alarm. He will soon cry and begin to breathe regularly. When the tube is in position, the funnel should be held the length of the tube, two and one-half to three feet, above the patient's body, and the water, which should first be boiled, poured into it. At first the water may remain stationary in the funnel, owing to the pressure of air in the stomach and the straining of the child. When the child relaxes or the air escapes, being forced upward through the water, the water will pass rapidly into the stomach.

The apparatus described under Gavage (page 141, Fig. 17) is used. It should always be boiled before using. If much mucus is present, a 1 percent solution of boric acid or borax may be used. The amount introduced into the stomach at one time varies

with the age of the child. In a baby of one week, one ounce may be used; at six weeks, two ounces; at six months, from four to six ounces. It is rarely advisable to introduce more than six ounces at one time. The fluid is allowed to run into the stomach and is then siphoned out by lowering the funnel, the process being

FIG. 20.—LAVAGE.

repeated until the fluid returns perfectly clear. From one to two pints of water may be necessary to complete the washing.

Indications.—It is rarely necessary to wash the stomach oftener than twice in twenty-four hours. Ordinarily, in the acute vomiting cases, one washing daily for four or five days will answer. In cases of chronic indigestion with regurgitation, the washing will be

needed less frequently. Here, once a day, or once every second or third day, will answer.

The following is frequently the history of a case of chronic indigestion with vomiting: There has been for several weeks, vomiting of food and mucus, two or three times daily. The stomach was washed, the child carefully dieted with a plain barley-water or a weak milk mixture, and no vomiting had occurred for perhaps twelve, twenty-four, thirty-six, or forty-eight hours, when the regurgitation or vomiting again commenced as before. In such a case it will soon be learned how frequently the washings should be repeated in order to control the vomiting. A recent patient represents my management: A child six months old suffering from malnutrition had a history of persistent vomiting after each feeding. A greater part of the food taken was lost. What was not vomited was digested imperfectly, as was shown by the stools. The stomach was washed and a large quantity of thick mucus and curds removed. The child was placed on a barley-water diet. There was no vomiting for three feedings and then only a small quantity of barley-water was thrown off. After three days, with daily washings, the vomiting entirely subsided. The child was put on a weak milk mixture, one-fifth milk and four-fifths barley-water, and no vomiting of moment resulted. The food was carefully strengthened, and although in two weeks the vomiting had entirely ceased, the washings were continued at intervals of two or three days for a month, until the water siphoned out was free from mucus. In severe cases of chronic indigestion the washings at intervals of two or three days may be continued with advantage for several months.

It must be remembered that in these chronic cases of indigestion, the patient is ill through abuse of the stomach—usually because too strong food has been given, or too much of a suitable food was given at too frequent intervals. As important, then, as the stomach-washing, is the placing of a child on a food suited to its digestive capacity. Lavage is of little service if the bad feeding continues.

The field of usefulness of lavage is not entirely confined to vomiting cases. Children with indifferent appetite and limited food capacity, without vomiting, are often greatly benefited by it. A story frequently heard in our consulting room is as follows: Food is taken without relish. The child must be coaxed to eat. There is loss of appetite, usually the result of improper food or faulty feeding methods. Some patients are absolutely indifferent to food; many refuse it altogether. In this class of patients a stomach-washing once a day will often be followed by a surprising improvement in the appetite. I know of no better appetizer for many of these pitiful looking babes. In not a few instances I have been surprised at the large amount of mucus removed from the stomach of one of these children in whom there had been no vomiting

whatever, which teaches us that there may be, in infants, stomach disorders of considerable importance without vomiting or, in fact, without any other symptom than loss of appetite and malnutrition.

HEMORRHAGE FROM THE STOMACH; VOMITING OF BLOOD

Excluding hematemesis in the newly born, the vomiting of blood by infants has been due, in my experience, to ulceration of the stomach (page 195), to purpura fulminans (Henoch's), or to accidental causes. In two of my proved cases, extensive ulceration of the stomach was found at autopsy. A boy six years of age died on the third day with purpura fulminans. There were profuse hemorrhages from the stomach, from the mucous surfaces, and under the skin. Ulceration of the stomach is usually associated with marked gastric disturbance, such as is seen in gastritis and in the different forms of malnutrition. Accidental sources include the swallowing of blood, which may take place as the result of a nasal hemorrhage or from a blow or fall causing injury to the nose or mouth or from the presence of a foreign body in one of the nostrils. Injury to the pharynx also may be followed by hemorrhage sufficient to cause vomiting, if the blood is swallowed. A case of hematemesis in a well-nourished breast-fed infant five months of age, gave me a great deal of anxiety. The vomiting of blood continued for several days without the slightest evidence as to its source. It occurred two or three times a day, usually shortly after nursing, the quantity of blood being especially large after the early morning nursing. There were no cracks or fissures in the mother's nipples, nor could blood be made to exude from any portion of the nipples on reasonably strong pressure. I concluded, nevertheless, that its source must be the breast, and applied a breast-pump, making use of as strong suction as possible, and obtained milk with a large mixture of blood. Evidently there had been a rupture of some of the smaller blood-vessels in the gland behind the nipple. At the first nursing, the child was very hungry and tugged vigorously at the breast, which doubtless explains why the early morning vomiting showed the most blood.

DILATATION OF THE STOMACH

In children of any age the stomach capacity may be found greatly increased. Bottle-fed infants under one year of age furnish the most of the cases.

In the absence of pyloric stenosis (page 196), the persistent feeding of too large quantities of food is the cause. It is not at all infrequent, in cases of malnutrition and athrepsia, to find the patients taking at every feeding from two to three ounces above the normal stomach capacity for children of their size and weight. Infants with dilated stomachs almost invariably suffer from indigestion, usually with the vomiting of milk curds and mucus,

the vomiting generally taking place a considerable time after the feeding.

Oftentimes, in these cases, the nourishment that has been given is of the proper strength, and all that will be required is to reduce the quantity allowed and perhaps increase the frequency of the feedings. The stomach should be washed daily, if the child resists the simple reduction in the amount of fluid. Particularly is the stomach to be washed, if there is a tendency to fermentation in the stomach-contents. The food should contain a low fat and a moderate amount of sugar. A reasonably high proteid may usually be given. Because of the tendency to fermentation, these cases do badly on the gruel diluents also, which, if they have formed a part of the child's diet, are to be discontinued. Small doses of bismuth subnitrate—five grains, with two grains bicarbonate of soda, two hours after each feeding—have a decidedly beneficial effect. Hydrochloric acid should not be given and pepsin is unnecessary.

Dilatation of the stomach, after the eighteenth month, will be found due to the same cause of overfeeding, or the condition may have been brought forward from earlier infancy. At this age, it is seen most frequently in children who take large quantities of milk with their regular meals. Milk being no longer a necessary part of the diet, it may now be replaced by more concentrated food, such as meat, eggs, and cereals in moderate amount. Not over four ounces of fluid should be given with any one meal. The habit of drinking with meals is best broken by encouraging the child to drink between meals. One hour before each feeding he should be given eight ounces of water. It should be given cool, not cold, at a temperature of from 50° to 60° F., and should be drunk slowly. It is considered particularly necessary to give water one-half hour before the first meal of the day. In my estimation it is equally important to give it before *each* meal.

ULCERATION OF THE STOMACH

In a large autopsy experience among infants and young children, I have as yet to see a perforating ulcer, either tuberculous or otherwise. In fact, aside from those of the newly born I have seen at autopsy only two cases of ulceration. In three other cases, the diagnosis of ulceration was made because of hematemesis. In one, a child one month old, blood was repeatedly vomited. The child bled to death. At autopsy about two ounces of coagulated blood were found in the stomach. The mucous membrane of the stomach was the seat of many ulcers varying in size, but none exceeding one-sixteenth of an inch in diameter. Another patient, three months old, had chronic gastro-enteritis with occasional vomiting of blood. The child died from exhaustion, the autopsy showing multiple small ulcers in the mucous membrane of the stomach. That ulcerations, even of a mild degree, play any great part in the digestive disorders

of infants and young children is disproved by the infrequency of the lesion at autopsy, in children dying from gastro-enteric or other diseases.

In treating cases of gastric disorders by stomach-washing, it is comparatively rare that blood is found in the water siphoned off. At rare intervals the water may be tinged with blood, but the washings invariably should be continued in spite of this, as I have never known any hemorrhage of moment to follow. The blood which appears under these conditions is doubtless from the capillaries of the congested mucous surface, distended as a result of strain. Although such cases are rare, one never knows but that his next case will be one of them.

Treatment.—In the event of persistent vomiting of blood of small or large amount which cannot otherwise be accounted for, it should be regarded as coming from the walls of the stomach. Under these conditions, food by means of the stomach should be discontinued and the nutrient enema (page 145) should be brought into use. Bromid and chloral, or stimulants if necessary, may thus be given with the food. Calcium lactate should be given in two-grain doses and continued for twelve hours after the vomiting ceases. After thirty-six hours water may be given in small amounts, and the giving of the usual milk mixture diluted one-half, in small quantities, two or three ounces, may also be commenced. The normal diet should not be resumed in less than a week, even with an entire absence of vomiting during this period.

CONGENITAL PYLORIC STENOSIS

In the chapter on persistent vomiting it will be found that stenosis of the pylorus is mentioned as one of the possible causative factors of repeated vomiting. The condition of hypertrophy of the pyloric end of the stomach with narrowing of the outlet is practically always of congenital origin, even though the symptoms of vomiting may not appear for three or four weeks after birth.

That a stenosis exists, is suggested by the character of the vomiting. Two factors are at work in these cases, the spasm and the stenosis. The time of the occurrence of the vomiting suggests also the seat of the trouble. Three or four nursings or feedings may be taken and retained, when suddenly a considerable portion of these feedings is ejected. The vomiting differs from that of gastric disorder, in that it is expulsive, one forcible ejection taking place which removes all or a portion of the stomach contents. There usually is no associated diarrhea or other evidence of intestinal involvement, aside from constipation, this being in marked contrast with the ordinary acute digestive derangements of infancy. In two hours after feeding, the stomach of a nursing infant should be practically empty. The introduction of a stomach-tube in a case of stenosis will show that a greater part or all of the food is still in the stomach if it has not

previously been vomited. The "stomach wave" is one of the characteristic signs of the condition. Beginning at the cardiac end, the contractions of the stomach produce a wave-like movement of the abdominal wall, as though a ball were moving under it, making a pressure on the parietes. The ball-like movement is further suggested by the gradual relaxation of the portion of the abdominal wall first contracted, which leaves the parietes as before. The contraction continues until the pylorus is reached. Persistent vomiting, expulsive in character, in a newly born infant, associated with scanty, well-digested stools, should always suggest to our mind the possibility of pyloric stenosis.

Treatment.—The only treatment, in the great majority of instances, is operation. In a gastro-enterostomy, considering the age of the patient and the usual emaciated condition, the outlook is not promising, the mortality being necessarily high. A few cases in which there is but little hypertrophy and moderate stenosis recover without operation. Before resorting to operation, there must be the strongest evidence that the child will not recover without it, as operation should be a last resort. This should be decided as early as possible, before there is a loss of too much strength and power of resistance. By weighing the stripped patient daily, it is not difficult satisfactorily to convince ourselves of the advisability of delay. If the child loses weight day after day, operation by gastro-enterostomy or divulsion[1] should not be delayed. If the weight is stationary, or if but a slight gain is made, temporizing may be permitted, with the hope that greater improvement will follow. The patient should be given the advantage of the best nourishment possible—human milk. If the mother cannot nurse the patient, a wet-nurse should be secured. The stomach should be washed at least once daily to remove the food residue.

PREVENTION OF THE ACUTE INTESTINAL DISEASES OF SUMMER

Preventive medicine, so called, is at the present time engaging the attention of the best medical minds. The acute intestinal diseases of summer, with their large infant mortality, offer a better field for life-saving measures than does any other department of pediatrics.

Potent etiologic factors in summer diarrhea are unfavorable climate and unfavorable environment. In the class which furnishes the largest mortality, climate cannot be changed for a sufficient number to exert any great influence on the general mortality. Through education the environment may be radically improved, but it cannot be changed. The hot months come and the tenement child must

[1] Dr. Geo. F. Still, of London, who has had a large experience with different operative methods, advises divulsion.

remain at home. Excursions and outings of various kinds are valuable in a small way to comparatively few, as the child must return to the tenement home at night or after a few days' absence, so that in our consideration of this class of patients in large cities we must accept unfavorable environment and hot weather—in other words, we must treat these cases in their homes. Those more fortunately situated, who can have the advantage of the country and intelligent care, are proportionately less liable to diarrheal diseases. Other than climate and environment, the determining etiologic factors among all classes are: first, a disordered gastro-enteric tract; second, infected food; third, faulty feeding methods; fourth, an absence of appreciation on the part of the parents and physicians of the fact that an attack of diarrhea or vomiting, or even a green undigested stool, occurring in an infant under eighteen months of age during hot weather, is to be looked upon as a serious matter requiring prompt attention.

Children as well as adults are frequently exposed to disease from sources of which they are ignorant, because their power of resistance is insufficient for their protection. With milk, the most readily infected of all nutritional substances, as the chief article of diet, it may safely be assumed that few infants pass through the heated term without having been subjected repeatedly to infection from bacteria sufficient to produce grave illness. An infant's best safeguard against intestinal infection is a strongly resistant gut, which is best secured by the absence of digestive disturbances at all seasons of the year. Feeding and intelligent management generally throughout the year has, consequently, a decided bearing upon summer mortality from intestinal diseases.

Seventeen years ago, at the commencement of my junior service on the house staff at the Country Branch of the New York Infant Asylum, I gained my first knowledge of summer diarrhea. While making rounds early one morning in June, the matter of summer mortality among the infant population was being discussed with the resident physician, the late Dr. Clarence E. Kimball. I asked why they had such a large summer mortality in an institution situated, as it was, at a considerable elevation, in the open country, constructed on the cottage and dormitory plan, with the additional advantage of good milk, favorable environment, good nursing, and competent medical attendance. His reply was: "Take your pencil and write as we go through the wards the names of the children I indicate." I did so, and, at the completion of the round, he directed me to keep the list of thirty names, saying that these children probably would not survive the summer. Seeking an explanation I remarked that they were not delicate or athreptic. "No," he replied, "they look well, but they have foolish, ignorant mothers, and susceptible intestines. They have had frequent attacks of diarrhea and indiges-

tion during the winter and spring. The mothers steal food from their own table and give it to the children when the orderlies and nurses are out of the wards. These children have but little intestinal resistance, and will give us our first fatal diarrheal cases when the hot weather comes." I kept my list and found that the accuracy of his prediction was startling. But four of the children named survived the summer.

Since that time I have had abundant opportunity to observe that the children who have had frequent attacks of intestinal indigestion during the colder months furnish our severe cases during the summer. A most important feature, then, in prophylaxis is to teach the mother how to feed and care for the child all the year round, and thus, by keeping well, he maintains a high grade of intestinal resistance.

Etiology.—The principal immediate etiologic factor of the disease which we have under consideration is an infection of the gastro-enteric contents by bacteria. The infecting elements are usually introduced by means of contaminated food and unclean feeding apparatus.

New York City Conditions and How to Correct Them.—For the well-to-do, we have high-priced dairies whose product sells from fifteen to eighteen cents a quart. For others, we have what is known as "certified milk," produced under the supervision of a committee of medical men, which retails at twelve cents a quart. Obviously, the majority of our infant population is not fed on these milks. The Straus Laboratories, which supply safe sterilized milk in New York City, are able to furnish it to but a small proportion of the tenement population. The other milk, the so-called "market milk," supplies nutrition for an immense majority of the infants of the poorer classes. This milk has been greatly improved of late through the efforts of the medical profession and the New York Health Department; but the matter of the regulation of milk production and sale is a large one, and the powers of the authorities are limited. The majority of our infant population, then, is fed on milk which, for them, is not a safe food; and it is among these infants that the large mortality occurs, and will continue in spite of seashore visits, daily excursions, and the efforts of the summer corps of Health Department physicians. It will continue until every large municipality, such as New York City, shall establish milk depots and ice stations where safe milk, and ice to keep it safe, may be obtained at a nominal cost, or free, if the parents are not able to pay for it. A visiting physician for these people is not absolutely necessary, nor is a visiting trained nurse,—both are expensive luxuries; but what is necessary is the appointment for a given district of women with just plain common sense to teach the uninformed mothers, who are doing their best according to the light they have, the

simple details of the infant's care, easily carried out when they know how, but so rarely done because they do not know how.

Dispensary Rules of Universal Application.—At the out-patient department of the Babies' Hospital and the New York Polyclinic, I have had abundant opportunity to come into close contact with a great many tenement mothers and tenement children. At these institutions we have a clientele fairly regular in attendance, year after year; for as one baby after another appears in the family, they are brought to us for treatment. At these dispensaries we have a surprisingly low summer diarrhea mortality, because we teach the mothers how to feed and care for their children all the year round. They are taught the value of fresh air, the use of boiled water as a beverage, and the benefits of frequent spongings on hot days. Both private and dispensary mothers whose children are under my care are given pamphlets of instruction and also oral teaching bearing on these points, and particularly as to the care of the feeding-bottle and the milk. In case special articles of diet are to be given, they are taught how to prepare them. Written directions are always given covering the point; nothing is left to the memory. Each mother and nurse has it impressed upon her that she must wash her hands in soap and water before touching the baby's food or feeding apparatus for any purpose, and that there must be a covered vessel in which the soiled napkins are to be kept until washed. At the first sign of intestinal derangement, regardless of the season of the year, they are taught to stop the milk at once, to give instead a cereal water, such as barley-water or rice-water, and a dose of castor oil. It is impressed upon them that, in winter as well as summer, a green, watery stool means that the baby is ill and needs treatment. When the mother learns the above lesson for December, January, and March, she will not forget it in July. Furthermore, as a result of the immediate correction of a child's digestive disorder during the winter months, we have a much less fertile field for pathogenic bacteria during the summer.

Prompt Treatment Essential.—Comparatively few cases of intestinal diseases have pronounced toxic symptoms at the outset. At first there are evidences of a mild infection only. There may be vomiting, with several green, watery stools, with a slight elevation of temperature, or the symptoms may be still more mild —only one or two loose, green defecations. Prompt treatment at this time, even in a crowded tenement, usually means prompt recovery. When treatment is delayed, when the administration of milk is continued, severe toxic symptoms and intestinal lesions are almost invariably the result.

New York City Experiments.—An interesting demonstration of what may be accomplished by proper care was made under the direction of Dr. William H. Park, of the New York Health Department,

during the summer of 1902. Fifty tenement children, ranging from three to nine months of age, were selected for the experiment. These children were all fed on the Straus milk. They were visited two or three times a week by physicians especially assigned to them. The mothers were carefully instructed as to the care of the milk, the feeding apparatus, and in other necessary details. With the first signs of illness, the milk was to be stopped, the physician notified, and suitable treatment instituted. Among these fifty tenement children, all under one year of age, all bottle-fed, selected at random, there was not one death during the summer. This valuable observation bears out my contention that the deaths of summer diarrhea among tenement children may be greatly reduced by the use of good milk given under proper supervision, supplemented by prompt and competent medical care at the first sign of illness. Perhaps in 1 percent of the cases of summer diarrhea a very severe direct infection is evident, and the condition of the patient very grave from the onset. In the remainder the invasion is gradual; and, if the warnings are heeded, the illness will usually terminate quickly in recovery.

How to Secure Good Milk.—To those of my patients of the better class who go to the country for the summer, and who have cows of their own in order to control their milk-supply, I give the following directions: Before milking, the udders and belly of the cow should be wiped with a damp cloth to remove clinging particles of dirt. It is in these droppings containing manure that the most dangerous forms of bacteria of decomposition enter the milk. The milker should wash his hands before milking. The first few jets of milk, coming from the ducts near the openings, are apt to be swarming with bacteria, and are therefore discarded. Immediately after the milking, the milk should be strained through several thicknesses of cheese-cloth, or through absorbent cotton, into an ordinary milk bottle, which is at once placed in a pail of cracked ice. Such simple care as this, even on an ordinary farm, gives a very low bacteria count. As may readily be seen, it is attended with very little trouble and expense. Different dairies throughout the country, which are located near my patients for the summer, meet the above requirements, for which they receive an extra compensation of five or six cents a quart.

The Necessity for Education.—It will be seen from the foregoing that the suggestions we have offered are all included under the one general heading of Education. The mother must be educated how to live, how to care for the baby, how to clothe him and bathe him during the summer. It must be impressed upon her that he needs all the fresh air available. She must be educated to the point of knowing what to do at the first sign of threatened disease. Municipalities must be educated to appreciate their responsibility as factors, negative or positive, in the summer mortality. The farmer must be

educated as to how to produce safe milk, and the consumer must be educated to appreciate its value and pay for it. Above all others, the physician must be educated along these lines so as to be able to teach the mothers how to do the right thing as to the care of her children all the year round.

ACUTE GASTRO-ENTERIC INFECTION; CHOLERA INFANTUM; GASTRO-ENTERIC INTOXICATION

This form of infection, while acute in character, is rarely of primary origin. It is usually preceded by a disordered gastro-enteric digestion. The onset of the urgent symptoms, however, is usually most pronounced, the child being taken suddenly with persistent vomiting, retching, and the passing of large watery stools, usually greenish in color. The prostration is extreme, the respiration becomes shallow, the eyes sunken, the skin ashen in color, the pulse soft and very rapid. The temperature may be high—105° F. or 106° F.—or it may never rise above the normal. The low-temperature cases with symptoms of pronounced prostration give us our most hopeless cases. The system is so overwhelmed by the infection that the patient is unable to react. I have seen infants die in twelve hours after the onset of the active symptoms. From this extreme degree of infection cases vary in severity, to one who is taken with a sharp attack of vomiting and high fever. Occurring coincident with or following within a few hours, there are several large watery stools. The fever soon subsides. The stomach is washed, the milk is withheld, boiled water or weak barley-water or rice-water No. 1 (see formulary) is given, and the child is well in a day or two.

Treatment.—The management of the case depends entirely upon the nature and urgency of the symptoms. In the acute choleraic cases with repeated vomiting, severe toxemia, retching, and profuse watery stools, stomach-washing and bowel irrigations are useless procedures. What we must do is to support the patient and aid him to bear the poison he has to contend with. If the temperature is high with a dry, hot skin, a cool pack to the trunk, 85° to 90° F., which is moistened with water at this temperature every half hour, will often control the pyrexia. If the feet are cold, hot-water bottles should be brought into use. If the temperature is below normal, and the peripheral circulation poor, as indicated by a leaden hue of the skin, a hot-water bath at 108° F. for five minutes will always be of service. The bath may be repeated at half-hour intervals. Other than this, the immediate treatment calls for hypodermic stimulation and sedatives. The administration by mouth of food or stimulants should not be attempted. Tincture of strophanthus and brandy, hypodermatically, have answered me well in these cases. Twenty drops of brandy with one drop of the tincture of strophanthus

may be given at intervals of one, two, three, or four hours, depending upon the urgency of the case. A combination of morphin and atropin may be used in cases with persistent vomiting, with a view to controlling the attempts at vomiting which exhaust the patient, and also to diminish the continuous loss of the fluids of the body, from the repeated large watery stools. Obviously morphin should not be given unless this condition exists. For a child one year of age $\frac{1}{50}$ grain of morphin is given with $\frac{1}{500}$ grain atropin, repeated as required, not oftener than once in two hours. After the first year $\frac{1}{30}$ grain of morphin may be given as an initial dose. Beneficial effects from the morphin will be noted in a diminution both of the number of stools and of the vomiting. In milder cases of infection, in which the vomiting and the stools are less frequent, a different course is to be pursued. In these cases there should be an abstinence from food, boiled water being given if the child can retain it. If vomiting persists, the water should be discontinued. The stomach should be washed at least once daily and the colon irrigated. If the irrigation brings away mucus and fecal matter, it should be repeated, at intervals of from eight to twelve hours. The child should never be disturbed for this purpose if the intestine continues to empty itself at frequent intervals. A reduction in the temperature, a cessation of the vomiting, and a diminution of the number and improvement in the character of the stools tell us whether or not the case is doing well and determine the further treatment, after the initial dose of castor oil or calomel has been given. As a rule, the milder type of case does better when calomel is used. If there is a tendency to vomit, the oil will rarely be retained, regardless of how it is given. From $\frac{1}{15}$ to $\frac{1}{10}$ grain of calomel may be given at fifteen-minute intervals until one grain is given. While slower in its action, it is ultimately of more benefit than the oil which is rejected. During the past summer I have used a solution of sulphate of soda (Glauber's salt), as advocated by Dr. L. E. La Fétra, of New York, with surprisingly good results. It is well retained, even in the vomiting cases, and when given in doses of two drams it produces a free watery evacuation without tenesmus. I usually prescribe it as follows:

℞. Sodii sulphatis..... ℥j
Elixiris simplicis..... ℥j
Aquæ.....q. s. ad ℥iv
M. ft. solutio.
Sig.—Two teaspoonfuls every thirty minutes until four doses have been taken.

When the vomiting has subsided, teaspoonful doses of plain water or barley-water, granum-water, or rice-water should be used at fifteen-minute or half-hour intervals, and both increased as to interval and quantity as the case improves. Alcohol in the form of brandy,

a popular treatment, should seldom be used in these cases, and when used, always well diluted, usually in the food. Vomiting babies should be given brandy very sparingly or not at all, as it is apt to increase the irritability of the stomach.

Milk Substitutes.—It is well in using milk substitutes, such as cereal waters, to use alternately, for the sake of variety, three or four different preparations. The child will not so soon tire of the milk substitute as when but one is given and more food will be taken. It is extremely rare that the substitutes barley, rice, or granum will not be taken if used in this way, particularly if made more palatable by the addition of salt and sugar.

The termination of acute intestinal infection is in death, prompt recovery, or in the development of ileocolitis. The transition to an ileocolitis in some cases is so sudden that its existence from the onset is often assumed. That such is not the case is proved by a large autopsy experience in hospital and institution work, on cases dying in a day or two from toxemia in which no intestinal lesions of consequence are found. When the diarrhea with loose green mucous stools continues with fever, it means that an ileocolitis has developed as a result of the action of the bacteria and the absorption of toxins by the intestinal mucous membrane.

Drugs.—Unusual care must be exercised in the use of astringent drugs in the cases we are discussing. I refer particularly to cases that are mild or moderately severe. It is to be remembered that it is in the intestinal contents that the trouble exists, and not in the intestinal structure, and that the diarrhea is a conservative attempt on the part of Nature to protect the intestinal structure. Our first efforts therefore should not be directed toward stopping the diarrhea, but toward assisting in the elimination of the intestinal contents—the source of the illness. The indiscriminate use of opium and astringents may do irreparable damage in a very short time through a locking up of the intestine with its bacteria and their toxins, which may be followed by a sudden rise in temperature, convulsions, coma, and death. Opium is a most useful drug in diarrhea in children, but it must be used with caution. When there is tenesmus with frequent large watery stools, it may be given in small doses sufficient to control the number and character of the stools with a view to preventing an excessive loss of fluids from the body. It should never be given when there are only four or five free evacuations in twenty-four hours, with more or less fever, as in these cases this number is required to maintain proper drainage. The opium should further be given independently of other medication so that its use may be stopped when the excessive number of stools ceases or in the event of a rise in temperature after it has been given. It would not be desirable, perhaps, to discontinue the bismuth or other drugs which may have formed a part of the prescription. In using

opium I prefer the Dover's powder, ¼ to ½ grain at intervals of two or three hours, for a child from six to eighteen months of age. Bismuth subnitrate in not less than ten-grain doses at two-hour intervals has given most satisfactory results. In order to be of service it must produce black stools. In other words, if the bismuth is not converted into the sulphid in the intestine it apparently is of no service; if it passes through the bowel unchanged, no favorable influence will be exerted on the intestinal contents. This occurs in a small percentage of cases. In such an event the necessary amount of sulphur is supplied by the use of the precipitated sulphur, one grain being added to each dose of the bismuth. A convenient and agreeable way of giving the bismuth is the following:

℞. Bismuthi subnitratis.....ʒv
Syrupi rhei aromatici.....ʒiij
Aquæ.....q. s. ad ʒiv
M. Sig.—One teaspoonful every two hours.

If sulphur is necessary a one-grain powder may be added to each dose of the bismuth mixture at the time of its administration. In the same way Dover's powder, if opium is indicated, may be dropped into the bismuth mixture. The bismuth is continued in the large doses until the child is ready for milk, when the dose is diminished one-half and continued until full milk-feeding is permissible or until constipation demands its discontinuance. In using the bismuth in the large doses advised, it is necessary that the chemically pure drug be obtained. If free nitric acid or arsenic is present, as is the case in some of the commercial bismuth on the market, vomiting may result or symptoms of arsenical poisoning may develop. Irrigation of the colon (page 219) may be used when there is a tendency to bowel inactivity with high temperature. With loose watery passages it is not called for.

Hypodermoclysis.—The injection of warm normal salt solution into the cellular structures of the body is frequently advocated by pediatric writers in the very urgent cases in which there is extreme prostration and rapid loss in weight due to the persistent watery discharges. I have employed this treatment in a great many cases and have never demonstrated that it is a measure of any great utility. In the cases where the addition of the fluid is needed most, it will not be absorbed because of the lowered vitality of the patient. Those whose tissues are able to take up the salt solution appear to do well without it.

Diet.—A difficult problem of no little importance is the nutrition of the patient after the acute symptoms have subsided. When the temperature has been normal for two or three days, when the character of the stools improves to such a degree that freer feeding than carbohydrate decoctions is to be thought of, unusual care is necessary in order to avoid a reinfection.

Skimmed Milk.—It must, of course, be our effort to resume milk-feeding as early as possible, but in resuming milk the amount given must be increased very gradually, giving at first only one-quarter to one-half ounce of skimmed milk in every second feeding of the cereal gruel. In not a few cases, even these small amounts will result in a rise of temperature and a return of the diarrhea. There are always bacteria remaining in the intestinal tract after an illness of this nature, which, under the influence of such a favorable culture-medium as milk take on renewed activity, and the whole illness may be repeated, perhaps with greater severity than the original one, if the milk-feeding is persisted in. I have repeatedly seen in consultation infants who were having what was called a relapse. What they did have was a reinfection with all the symptoms as severe or more severe than those of the first infection, and all because of a lack of appreciation of the necessity of great care in resuming milk. To avoid mistakes in feeding at this time, as well as early in the disease, all directions should be carefully written. Nurses and mothers who think the physicians are over-cautious and pity the hungry child are very liable to forget oral instructions and give more milk than is ordered. I always tell these people that when an order is disobeyed the responsibility is theirs. If the small amount of milk agrees it may gradually be increased by the addition of one-half ounce to each feeding every two or three days. Rarely, however, will it be possible or wise to attempt to give for the remainder of the summer as strong a food mixture as was taken before the illness. In milk-feeding at this time super-fat must not be used. Either full milk or skimmed milk properly diluted is given. If there is a tendency to relaxation of the bowels with frequent passages I order skimmed milk to be used. Whether the food shall be pasteurized, sterilized, or raw depends upon the conditions referred to under pasteurization and sterilization (page 115). Every summer I have infants under my care who after an attack of diarrhea cannot take even as small an amount of cow's milk as one-half ounce in each feeding. Not a few of the marasmic out-patient infants belong to this class. After a sharp intestinal infection with inability thereafter to take a nutritious diet, a *wet-nurse* may be secured for the well-to-do, but the wet-nurse's milk will not always agree, as I have repeatedly found. Children who have been very ill with any of the severe forms of acute intestinal diseases of summer have, as a result, a very weak fat-capacity, and the wet-nurse's milk, with its 3 or 4 percent of fat in some instances, produces sufficient diarrhea to require its discontinuance. When employing the wet-nurse in such cases it is best never to permit the child to have the full allowance of breast-milk at first. For a child from three to six months of age, for example, it is wise to give him two or three ounces of barley-water or a 5 percent milk-sugar water before each nursing, so that he will be satisfied with two or

three ounces of the breast-milk. When cow's milk cannot be given and the nurse's milk does not agree, or where for any reason a wet-nurse is not possible, we are called upon to furnish other means of nutrition, and this, with our available resources, will not be of a very high order for infants under one year of age. The animal broths are of very little service. They contain but little nourishment even if given in considerable quantity. They produce a decided laxative effect on convalescents from diarrhea. Their only use is in giving small quantities, an ounce or two added to the gruel to make it more palatable.

Strong starchy foods cannot be digested in sufficient amount to maintain the nutrition. It is under such conditions that dextrinizing processes (page 125) are of considerable service. The starch is thus converted into maltose, which is readily assimilable. Here, as in the broth, the relaxing effect of the food on the intestine may be felt, frequent bowel evacuations being a possible result. The dextrinized gruels, however, are always worthy of trial, and they have been of considerable service in many cases as a substitute for cow's milk. When breast-milk is impossible, canned *condensed milk* usually answers better than any other means of nutrition. It is much more easy of digestion than is fresh cow's milk, as is well known. It is added in small quantities at first to the cereal water made from barley, rice, or granum, No. 1 strength being employed. (See formulary, page 129.) One-half dram may be added to every second feeding for the first day. The following day this amount may be added to every feeding. It usually will be well taken and well digested. It is gradually increased until two, three, or four drams are added to each feeding. Where it seems desirable to use more than two drams to each feeding, the fresh or unsweetened condensed milk, if obtainable, furnishes the increased amount of proteid and fat without the excessive percentage of sugar. In not a few cases the combination of condensed milk and cereal diluent must furnish the nourishment for the remainder of the heated term. With the advent of cooler weather, one ounce of weak cow's milk with the cereal diluent may be substituted for one of the regular feedings, which later may gradually be increased one-half or one ounce at a time until the cow's milk comprises one-third of the food mixture. When this point is reached an attempt may be made to replace with cow's milk another feeding of the condensed milk. In this way by carefully watching the case a gradual replacing of the condensed milk by fresh cow's-milk feeding may successfully be brought about until cow's milk only is given.

After the first year, similar methods may be followed if necessary, although at this age cow's milk will usually be tolerated earlier and other means of feeding than the milk may be brought into use. Zwieback, bread crusts, and scraped beef—two or three

teaspoonfuls a day—will often be taken without inconvenience when milk in sufficient amount for proper nutrition disagrees. At this age the gruels also may be made stronger; No. 2 or No. 3 (see formulary, page 130) will often be well borne. An important point to be remembered in feeding convalescents from an acute gastro-enteric disorder is that the food must not be forced, and that the child must be fed only in accordance with his digestive capacity. This can best be determined by watching the temperature and the stools. The gruels as substitute feedings, whether alone or combined with condensed milk, may be given in quantities equal to those which the child was accustomed to take in health, but they may be given at more frequent intervals, never, however, oftener than every two hours. A child who has been fed at four-hour intervals may take the substitute at three-hour intervals. If fed at three-hour intervals, he may get the substitute at two or two and one-half hour intervals. When constipation follows a sharp attack of diarrhea, an enema must be used not oftener than once in twenty-four hours. The patient should not be given a laxative unless there is fever for several days after the acute symptoms have subsided.

ACUTE ENTERIC INFECTION

Acute enteric infection is of two clinical forms and is distinguished from gastro-enteric infection by the absence of vomiting. As with gastro-enteric infection, while it may be acute in character, it can hardly be considered the primary illness, as it is usually preceded by a latent type of intestinal indigestion. The onset of the urgent symptoms oftentimes is so sudden and so severe that it is regarded as the commencement of the illness. The prostration may be extreme, the temperature high—105° to 106° F. The eyes are sunken and the face is drawn and pinched. Convulsions and muscular twitchings are often present. In institution-infants I have seen death take place in less than twenty-four hours as a result of the profound toxemia. The milder forms, characterized only by a sharp elevation of temperature and moderate prostration, respond to treatment in a day or two.

Treatment.—As mentioned above, there are two types of infection, one with diarrhea and one with marked bowel inactivity. In neither is there vomiting. In both types castor oil, in doses never less than two drams, is to be given. This is followed by discontinuance of the milk, whether the patient is bottle-fed or nursed. As a substitute, barley-water, rice-water, or granum-water No. 1 (page 129) may be given with salt and sugar added for flavoring purposes. An advantage in the treatment of these cases is that, there being no vomiting, the food is usually well taken throughout the entire illness, as the patient is ordinarily very thirsty. With excessive diarrhea the indications for medication are

the same as those given under Acute Gastro-enteric Infection (page 202). Castor oil or sulphate of soda (page 203) is to be used instead of calomel, at the beginning of the illness.

Intestinal infection with *defective bowel action* often gives us our most difficult cases and requires different treatment. In this type, poisons generated in the intestinal contents seem to be of such a nature as to cause a partial paralysis of the small intestine, and it is often with the greatest difficulty that an evacuation can be induced. So difficult is it, in fact, that the possibility of an acute peritonitis or an intussusception is thought of by the physician. It is very necessary to maintain bowel action and to prevent the accumulation of gas, which by its distention of the intestine increases the tendency to constipation. Several cases of this nature with high temperature, sluggish bowel action, and intense prostration are seen by me every year.

A case in point came under my observation during the past summer. A female infant nine months of age had been a most difficult feeding case. In July she was taken with sudden high fever (105° F.) and convulsions, which were followed by muscle twitchings, head rolling, and marked prostration. The temperature was uninfluenced by local means, although there was no diarrhea or vomiting. The attending physician, anticipating intestinal infection, gave calomel in divided doses with frequent bowel irrigations. Foul-smelling fecal material came away with the irrigation, but the temperature and the nervous symptoms persisted; in fact, the condition became worse. I first saw the child when she had been ill, perhaps ten or twelve hours, and directed that one-half ounce of castor oil and a high irrigation of normal salt solution at 80° F. be given. As a result of the treatment there was one small green movement in addition to what came away with the irrigation, which was considerable. The patient was relieved somewhat and the nervous symptoms measurably subsided, though the temperature still ranged between 104° and 105° F. As a result of the calomel, one and one-half grains having been given, and the ounce of oil, a free diarrhea was looked for. It did not appear, however. I then directed that one-half ounce of castor oil be given daily in addition to the irrigations every eight hours. This was followed by a slight improvement in the symptoms, but it required five days of the treatment, one-half ounce of oil and one grain of calomel being given daily, with abdominal massage, before the resulting peristalsis was sufficient to relieve the intestine of its contents. After the establishment of free bowel action, the child recovered.

A similar case which resulted fatally was seen in consultation. In this case, a girl eight years old, the toxemia was intense. There appeared to be almost complete paralysis of the small intestine. Only small, very foul evacuations could be induced, in spite of the

most active local and internal measures. The child died from toxemia, before free bowel action could be established.

The management of these cases of the inactive type is partially illustrated in the histories above given. Our efforts are to be directed toward supporting the patient by the use of stimulation, hypodermically or by the stomach, and by the use of a non-milk diet, powerful laxatives, and frequent colon flushings. Castor oil will often need to be given repeatedly and should be given freely—at least one-half ounce every twelve hours—until four or five passages in twenty-four hours result. Sulphate of soda (page 203) is given with satisfactory results in this type of cases. While the fever, prostration, and bowel inactivity persist, it is necessary to continue the irrigations. In a few cases, apparently better results were secured by using for the irrigations cold water (70° to 80° F.) with the addition of Epsom salts, one ounce to the pint.

Stimulants.—Because of the tendency to convulsions and nervous irritability, strychnin should not be given. The tincture of strophanthus answers better than any other heart stimulant. Alcohol should be used only under the most urgent conditions of prostration.

If hypodermic stimulation is called for, a combination of tincture of strophanthus and brandy, or digitalin and brandy, answers well. For a child six months of age, twenty minims of brandy with one drop of tincture of strophanthus, or twenty minims of brandy with $\frac{1}{300}$ grain digitalin, may be given and repeated according to the requirements of the case—every two hours if necessary. After the first year, children may be given as much as $\frac{1}{100}$ grain of digitalin or two drops of the tincture strophanthus.

Irrigation of the colon (page 219) is now a measure of inestimable value, both for its immediate local effect and also for increasing general peristalsis and thus emptying the small intestine. An increase of the peristalsis is sometimes well secured by the following procedure: After the colon is washed with a normal salt solution at a temperature of 95° F. the tube is introduced as far as possible and eight ounces of water at 60° F. is allowed to escape. The tube is immediately removed and an attempt made by elevating the buttocks and pressing them together to have the child retain the solution for a few moments.

In using nutrient enemata and in colon flushings for purposes of supplying fluids to the circulation we have found that the solution is best retained when it is introduced warm—at a temperature of about 100° F. The cooler the solution, the more quickly is it expelled through exciting peristalsis. This fact may be taken advantage of in these cases of bowel inactivity. After an enema of cool water peristalsis of the small intestine will often result in the passage of a considerable quantity of its contents into the colon to be expelled later with the water. This I have frequently demonstrated. The

action of the cool water will be further assisted by maintaining light abdominal massage after the tube is removed. Recovery may follow the clearing out of the intestine, or an ileocolitis may result, as in gastro-enteric infection. The process of transition may require but a surprisingly short time, and if recovery is not prompt an ileocolitis will almost certainly be the outcome.

Upon resuming the milk diet the same precautions relating to the use of cow's milk must be observed as referred to under Acute Gastro-enteric Infection (page 205).

LACTIC ACID BACILLUS IN THE TREATMENT OF ACUTE INTESTINAL INFECTIONS

Prompted by the optimism of Metchnikoff and his followers, the treatment of the acute intestinal infections of a severe type was carried on at the Babies' Hospital during the summer of 1908 in the use of cultures of the lactic acid bacillus which were supplied by the Lederle Laboratory. The duration of the treatment ranged from two to thirteen days. The observations were made on eighteen children, ranging in age from four to fourteen months. At the suggestion of Dr. Nathaniel Bowditch Potter, who supplied the material, a culture of the bacilli, one-half to one ounce in amount, was injected into the descending colon daily. In addition to the above, an irrigation of the colon with eight ounces of a solution containing the bacilli was used in twelve cases. Again, in six of these the lacto bacilline tablets were administered by the mouth, one-half tablet every two hours. Among these cases eleven died. In two there was no improvement after the treatment and other treatment was instituted. In one there was very slow improvement and the treatment exerted no benefit. Four recovered under the treatment. Among the six that were fed the lacto-bacilline tablets, five died and one recovered.

As our results with the lactic acid bacillus were so disastrous, giving a much higher mortality than the usual methods of treatment, its use was discontinued and our usual management resumed. Our results with the feeding of milk which had been subjected to the action of the lactic acid bacillus will be found on page 120.

ACUTE ILEOCOLITIS

A great deal of confusion has been occasioned by attempts at a nomenclature of the acute inflammatory diseases of the intestine which shall make the clinical aspect of the cases fit the pathologic findings. Differentiation, ante mortem, into catarrhal, follicular, and ulcerative types is impossible, as has been proved by the care and daily observation in institution and hospital work of cases that have later come to autopsy. Consider briefly, for illustration, the gravest cases, cases which at autopsy show most extensive

ulceration of the intestine. In many of these there was a low temperature, from 100° F. to 102° F., and the stools never contained a particle of blood. In others, in which perhaps considerable blood was passed for several days, there will be but a mild congestion of the mucous membrane of the large intestine. Others will continue for a considerable time, from two to three weeks, with moderate temperature, and die from exhaustion and show nothing at autopsy but an enlargement of the solitary follicles with areas of congestion in the lower portion of the small intestine. Recent work in the bacteriology of the acute intestinal diseases has added nothing to our knowledge as to the treatment of the condition, and consequently does not call for discussion here. Acute ileocolitis may be the primary intestinal disease. In this condition the temperature is usually considerably elevated at the commencement of the illness. After an evacuation of two or three undigested stools, the passages consist of light-colored mucus, oftentimes streaked with blood, or they are of green mucus and streaked with blood. The passages are small, frequent, and attended with considerable pain and tenesmus. I have repeatedly seen from twenty to thirty such passages from one patient in twenty-four hours. Far more frequently, however, this condition follows an acute gastro-enteric indigestion or an intestinal infection, the dangers of which were not appreciated, and the case consequently was improperly treated, the lesions produced being due to the bacteria and their toxins, which had abundant opportunity to produce pathologic changes in the intestinal mucous membrane, the extent of which could only be conjectured during life.

The duration of an ileocolitis is longer than that of any of the intestinal disorders previously mentioned. With the establishment of the disease it is rare for a case to recover under ten days. It oftentimes means an illness of two or three weeks, and sometimes a longer period must elapse before the usual diet may be resumed. The temperature range is variable—from normal to 104° F. There is always emaciation. The degree of prostration is dependent upon the amount of toxemia, the extent of the lesion, and the management of the case, particularly as relates to supportive measures and the nature of the nutrition.

Treatment.—Milk is to be stopped at once, whether the patient is breast-fed or bottle-fed. Barley-water, granum-water, or rice-water No. 1 (see formulary, page 129) constitutes the basis of diet for children under one year of age. Older children may be given the No. 2 strength. To these carbohydrate foods may be added an ounce of chicken or mutton broth, with salt or sugar, to make them more palatable. It is well, for variety, to make up two or three cereal preparations and alternate their use. In this way the foods will be better taken and for longer periods than if but one is prepared. In

this form of substitute feeding, an amount similar to what the child was accustomed to in health may be given, but the intervals may be shorter by one-half hour or one hour.

Drugs.—In a large experience with acute colitis in institution and out-patient work, there has been abundant opportunity to test the value of different drugs that have been advocated from time to time for the disease. Drugs which have proved of unquestioned value are castor oil, calomel, subnitrate of bismuth, and opium. Drugs which have an occasional application are sulphur and the preparations of tannin. Constitutional measures, supportive in character, such as heat and stimulation, are, of course, used when indicated, as in any severe exhaustive illness. At the commencement of the attack, two drams of castor oil should be given. If this is not retained, from one to two grains of calomel should be given in divided doses—one-quarter grain every hour. Bismuth subnitrate is best given according to the suggestions on page 205. The prescription calls for ten-grain doses. If black stools do not follow its administration, one grain of precipitated sulphur is added to each dose. To be effective the bismuth must be given in large doses. Two or three grains at intervals of two or three hours are of no value. In cases over one year of age, fifteen to twenty grains are frequently given at two-hour intervals. When there is much pain and tenesmus with frequent, scanty, muçous stools, opium may be used with advantage, with a view of controlling the tenesmus and diminishing the frequency of the stools. Paregoric or Dover's powder is usually selected for this purpose. Dover's powder is preferred because of the absence of a disagreeable taste and the convenience of its administration. It may be added to the bismuth at each dose, not combined with it in a prescription, for uncombined it may at once be discontinued or given in smaller doses with a diminution in the number of the stools.

Careful instructions should be given when prescribing opium. It is to be given for a definite purpose, to prevent straining and the frequent passages due to excessive peristalsis. As in acute intestinal infection, particularly if there is temperature, it is not well to attempt to reduce the number of the stools below four or five in twenty-four hours, and of course opium is not to be given at all unless the stools are very frequent. Not a few cases do admirably under the cereal water diet, castor oil, bismuth, and sulphur. The amount of opium that will be required in a given case may readily be determined by carefully watching the character and frequency of the stools. For children under one year of age, the dosage of Dover's powder is from $\frac{1}{8}$ to $\frac{1}{2}$ grain at two-hour intervals, not more than seven doses being given in twenty-four hours. From the first to the tenth year, the dose ranges from one-half grain to two grains. Mothers and nurses are to be instructed that when there

is a rise in the temperature or when the child becomes drowsy after its use the opium is to be discontinued or the dose reduced one-half —another advantage of giving it independently. The younger the child, the greater caution to be observed in its use. Tannalbin, in doses of two grains in infants, and from five to eight grains in older children, is sometimes of service when there is a tendency to large watery stools or stools containing large quantities of mucus. This also may be given at the same time as the bismuth. When heart stimulants are necessary, the tincture of strophanthus is usually selected. Digitalis is not well borne by the stomach, and for the same reason, as well as for its unfavorable effect upon the kidneys, alcohol should be given with caution. When used, it should be well diluted and given only temporarily during the urgent period of acute toxemia. Its prolonged use invariably interferes with the stomach function.

Hot Applications.—Hot stupes or hot compresses to the abdomen are often most grateful to the patient, when there is abdominal pain and tenesmus. The hot applications should be changed every fifteen or twenty minutes, never being allowed to become cold.

Colon irrigation should be used at least once in every case of colitis, normal salt solution being employed at 100° to 105° F. The solution should always be used warm, as it has a pronounced sedative effect in some patients when used in this way. It thus may fulfil two purposes. Whether the irrigation is repeated or not must depend upon its effect upon the patient. When he strains against it and there is no apparent diminution in the number of the stools, it should not be repeated. Frequently, however, the intestine remains quiet and the number of passages diminishes, after a warm irrigation—105° to 110° F. In such cases it may be repeated twice daily. In cases in which there is not an active bowel action, where decomposing blood and mucus are removed by the washing, it may be used once or twice daily. Only in the rarest instances when there are high fever and delayed bowel action should intestinal irrigation be practised oftener than once in twelve hours. This line of treatment is oftentimes overdone, as is apt to be the case with any useful measure.

Irrigation should always be used for a definite purpose and discontinued when that purpose is accomplished. Every year, at the close of the heated term, I see cases of chronic colitis without fever which are being irrigated two or three times daily without any indication for the irrigation other than the mucous stools. Irrigations, without question, help to keep up the secretion of mucus, for I have repeatedly seen it disappear entirely in a few days without other treatment after the discontinuance of the irrigation. When irrigation is practiced frequently in those with inactive peristalsis, it is possible to produce a general edema. This has been done experimentally in well children.

Starch and Opium.—The time-honored remedy—the injection of starch and opium—may be of service in the cases in which there is much tenesmus with the passage of small amounts of blood-streaked mucus or when bloody mucus exudes from the rectum. In these cases the principal lesions are usually located in the sigmoid and rectum. A straight-pipe, hard-rubber syringe answers best for this purpose (Fig. 18). A starch solution of the strength of one dram of starch to an ounce of boiled water is used. For infants under one year of age five drops of laudanum may be added to two ounces of the starch solution and repeated at intervals of six to eight hours. Older children may be given from eight to twelve drops of laudanum with four ounces of the starch solution; this may be repeated in four to six hours.

Improvement in the colitis is indicated by a subsidence of the temperature, a change in the character of the stools from green or clear mucus with blood and scarcely any odor, to passages which gradually take on a fecal odor and show the presence of feces mixed with mucus.

The Influence of Climate.—When it is felt that the case is under control, a change of climate is most beneficial. A child who has had colitis at the seashore or in town, will invariably have its recovery hastened by a removal inland to the mountains or among the hills, where an open-air life is to be insisted upon.

Diet in Convalescence.—With a subsidence of the fever and an improvement in the number and character of the stools, the patient's troubles are not over. The problem of nutrition is often a difficult one. The child has necessarily been on a reduced diet for several days, oftentimes for two to three weeks. If better nutrition than cereal gruels is not soon forthcoming, the patient faces the danger of malnutrition and marasmus, which is the outcome in not a few of the badly treated cases in which the disease is not quickly fatal. The use of milk in some form must sooner or later be attempted.

Children who have had colitis bear fat very badly. The younger the child, the more certain is this the case. This has been so forcibly impressed upon me that I have discontinued attempts at feeding these convalescents even with small quantities of whole milk. I have found that they do best on a carbohydrate gruel as a basis of diet, to which sugar of milk is added in the proportion of from one-half to one ounce to the pint, thereby furnishing material for heat and energy. To this sugar-cereal combination, skimmed milk in small quantities is added, not over one-half ounce, and that to only one of the feedings, the first day that milk is given. If this causes no inconvenience an increase of one-half ounce is made at every second feeding the following day, and an increase

of one-half ounce at every feeding the third day. The total quantity of food given at each feeding is to remain the same, an equal quantity of the cereal diluent being removed to make way for the milk increase. Thereafter, if all goes well, an increase of one-half ounce is made in each feeding every day, until the child is taking his daily feedings of skimmed milk one-half strength. In some cases it may be found that the child's capacity will be only two ounces of skimmed milk at a feeding with the cereal water diluent. Here he must be held, perhaps for a week or two, before milk can safely be advanced. Usually the younger the child, the more difficult will be the resumption of the milk diet. After the first year the nutrition may be assisted by a thick gruel, such as No. 2 (see formulary, page 130), zwieback, bread crusts, or rare scraped beef—two or three teaspoonfuls daily. For infants under one year of age who cannot take even a weak dilution of skimmed milk, one-half to one dram of condensed milk may be given in the cereal water diluent. A combination of the canned condensed milk and granum No. 1 (page 130) will usually be well taken. If there is abdominal distention from starch indigestion, the granum may be dextrinized (page 129). Barley-water also answers well as a diluent for condensed milk. In adding canned condensed milk to the cereal water, sugar is to be omitted. The milk may be increased slowly until from one to four drams are given at a feeding. Under no considerations, however, unless we are forced to it, should this diet be permanent. After from two to four weeks, the use of cow's milk should be attempted, replacing one feeding of the condensed by a small amount of cow's milk, one-half to one ounce in the customary diluent. To the cow's-milk mixture a small amount of cane-sugar, twenty to thirty grains, should be added, as the child has been accustomed to the sweet food furnished by the canned condensed milk. Obstinate constipation sometimes follows recovery from severe ileocolitis. This is to be managed along the lines laid down for the management of constipation (page 178). Following an attack of ileocolitis, the patient must never be allowed to pass twenty-four hours without an evacuation of the bowels. A standing order should be given that an enema should be used when this does not occur.

CHRONIC ILEOCOLITIS

Cases of chronic ileocolitis coming under my care have invariably been preceded by acute attacks, those that were unusually severe or that were badly managed. These cases represent one of the forms of malnutrition, but are of such a nature as to require special consideration. The patient is emaciated, the skin is dry and rough, the circulation is poor, the extremities are cold, and the temperature often subnormal, with an occasional sharp rise. The abdomen is always distended with gas. The stools usually are loose,

number three to four daily, and contain mucus in considerable amount. The mucus may be absent for two or three days, when there will be a rise in temperature to from 102° F. to 105° F., when large quantities will be passed with a very foul odor. The nervous symptoms are usually marked. The child is irritable and sleeps poorly.

In assuming the care of one of these cases it is well to inform the parents that a rapid improvement is not to be looked for. A case under my care at the present time, aged three and one-half years, and which is now making satisfactory progress, weighs but twenty-three pounds—two pounds less than when she was eighteen months old. During the first six months that I treated her, there was very slow improvement, in spite of every advantage that care and change of climate could afford. The management consists in diet, change of climate when possible, and supportive measures. It is for the physician to find out in a given case what means of nutrition is best. These cases vary considerably in their digestive possibilities, with the exception that they all bear fat foods badly.

Treatment.—*Diet.*—Chronic colitis is very fatal in young infants and but few survive. Practically, the only hope for infants under one year of age is breast-milk, which at first must be given in small quantities. Sugar-water should be given before the nursing. These young infants do not do well on starchy foods unless they have been dextrinized (page 125); when predigested, they may have too laxative an effect and should be given in small quantities. The use of starch, therefore, in these cases, for a considerable time at least, is limited.

For older children, after the first year, skimmed milk, rare scraped meat, junket, and coddled white of egg or raw egg usually answer best.

In children under one year of age for whom the breast is not available, the white of egg may be beaten up and given in skimmed milk or in dextrinized gruel, No. 3 (page 129), if it agrees, or in plain water with salt added. The whites of two or three eggs may thus be given daily with benefit. Zwieback or bread crusts may be given in small quantities. These cases readily develop the alcohol habit, so that if given at all, its use should not be long continued. The feedings are necessarily more frequent than in well children. I usually feed them five times a day—at four-hour intervals.

Enemata.—There should be a standing order for an enema after every interval of twenty-four hours if no movement from the bowel takes place during that time. Absence of bowel movement in these cases almost invariably means fever, prostration, and perhaps convulsions. If there is a tendency to constipation, as there will be in some cases, some laxative, such as magnesia or the aromatic fluidextract of cascara, should be given daily in sufficient amount to insure at least one free evacuation.

Irrigation of the colon is not to be used as a routine measure. It

is indicated whenever there is a rise in temperature, even though the bowels moved but a few hours previously. A laxative, preferably castor oil or calomel, is given also. The further treatment calls for salt baths, oil inunctions, and the open-air life referred to in the section on Malnutrition (page 162).

MUCOUS COLITIS

Attention has elsewhere been called to the necessity, in some of the diseases of children, of ignoring what appears to be a local manifestation of disease, and treating the patient along dietetic and hygienic lines. This necessity is in no disease better illustrated than in mucous colitis, a disease fortunately rare in children, yet seen with sufficient frequency to warrant our attention. The patients who have come under my care have invariably been of a pronounced neurotic type, usually of neurotic ancestry, and invariably from a neurotic environment.

In children with mucous colitis the appetite is capricious, the bowels are usually constipated, the child is chronically irritable, and he is apt to complain of ill-defined pains in the abdomen, which are never very severe and are not necessarily associated with the taking of food. There is usually slight generalized pain on pressure. One of my cases under treatment at the present time, a child four years of age,—the most pronounced case that I have ever had under my care,—has never had the slightest evidence of pain on pressure or otherwise. With the dejections, there is usually mucus in considerable amount, occasionally passed in large masses, at other times in long tenacious strings, sometimes referred to as "ropy." There may be several consecutive days in which little or no mucus will be passed, then large amounts of it will suddenly appear.

The disease rarely follows an acute inflammatory process in the intestine. In the majority of instances the previous history has been one of obstinate constipation in a markedly neurotic, underfed child, the constipation having existed perhaps during his entire life. Almost without exception the treatment has been by the use of colon irrigations, using various kinds of astringents, such as solutions of tannic acid, nitrate of silver, etc.

Treatment.—*Local Measures.*—The method of treatment to which these cases most quickly respond is to discard those local measures which often act as irritants to the intestinal mucous membrane. Usually as a result of previous treatment and because of the nature of the disease the constipation is most obstinate. For this I use the olive oil injection at bedtime, two to three ounces, the tube being introduced eight inches into the bowel (page 185). After breakfast on the following morning the child is placed at stool, and if no passage occurs in fifteen minutes a glycerin suppository is inserted. By this means one passage daily is usually insured, and this, ordinarily, is all that is required. Should this

fail, from one to two drams of the aromatic fluidextract of cascara should be given at bedtime in addition, the medication being discontinued as soon as it is demonstrated that an evacuation will occur without it. Local measures other than those suggested for constipation are not to be employed.

Diet.—Not infrequently these patients have been taking a considerable amount of milk. This is immediately discontinued. In its place malted milk or whey is given as a drink. The further diet consists of whole-wheat bread, animal broths, cereals cooked three hours, eggs, poultry, red meat, stewed fruit, and fruit-juices. Spinach and asparagus are the only vegetables allowed at the beginning of the treatment, and these by no means should always be given. Purées of peas, beans, and lentils are given freely. The use of butter is also encouraged. I endeavor to have the patient take three ounces daily. It may be given on bread or on the cereal.

Drugs.—Strychnin and nux vomica appear to exert a very beneficial influence on these cases. The combination of nux vomica and quinin has been very satisfactory. For a child from five to ten years of age the following should be ordered:

℞. Tincturæ nucis vomicæ .....gtt. xc
Quininæ bisulphatis.....gr. lx
M. Div. et ft. capsulæ No. xxx.
Sig.—One capsule after each meal.

A child suffering from mucous colitis invariably shows malnutrition to a considerable degree. For details as to sleep, rest, exercise, and baths, all of which are more important than medication, the reader is referred to the section on Tardy Malnutrition (page 164).

COLON IRRIGATION

Colon irrigation was brought prominently into use about fifteen years ago as a remedy in the intestinal summer disorders of young children. While unquestionably its usefulness in this respect has been overestimated, and the irrigation overdone, in selected cases it is of great service. Because a child has a summer diarrhea, a colitis, or any disorder of the intestine, it does not follow that irrigation is indicated, or that he will be benefited thereby. A child who is having a passage from the bowels every half hour or hour is not, according to my observation, a fit subject for irrigation. The colon is kept empty by the active peristalsis and the washing will remove nothing more than a few shreds of mucus. The cases benefited by irrigation are those in which peristalsis is not particularly active. When a child is running a temperature of 102° F. and over, with five or six green mucous passages daily, one or two colon irrigations a day will unquestionably be of service in removing the offending material from the intestine.

Every year we see a few cases of intestinal infection, particularly those of a very acute type, in which there is high fever, intense

prostration, and infrequent bowel action. Occasionally we see a case of this sort in which there is no movement whatever without assistance. In such cases colon irrigation is of inestimable value, and may be used with advantage as often as once in six or eight hours. The washing, even if properly conducted, is apt to be strongly objected to by the patient and should be completed as soon as possible. Too frequent irrigations, with strong medicated solutions, may keep up the mucous discharge indefinitely. In a few children the resistance with straining is so marked and so continuous that irrigation is impossible. These are usually children who, on account of the excessive peristalsis, do not require irrigation.

FIG. 21.—COLON IRRIGATION.

The irrigation is conducted as follows: Normal salt solution at 95° F. is ordinarily used and a quart usually suffices. If there is a great deal of mucus and blood a 1 per cent tannic acid solution is better. The irrigation should be continued until the solution returns clear. The temperature of the solution may be varied with advantage, depending upon the nature of the case; thus, in cases with subnormal temperature and intense prostration, cases of the so-called "algid" type, the solution at 110° F. will act as a decided stimulant. It raises the temperature, improves the pulse and the general condition of the patient. In cases with high fever—105° F. or 106° F.—a cold solution answers better. I have repeatedly used it as low as 70° F., and have often found that an irrigation with four pints of water at 70° F. would reduce a temperature three degrees.

For irrigation, a soft-rubber catheter, No. 18 American, is best, for the reason that its walls are stiff and the tube does not easily

bend upon itself, as is apt to be the case when an ordinary catheter is used. Should this occur, the water may escape an inch or two within the rectum, and obviously be of no service. When the tube, well lubricated, has been introduced for nine inches, the tip will have passed into the descending colon, and further introduction will be of no advantage. In order to be sure that it is in the colon, gentle palpation over the left side of the abdomen will enable one readily to locate it. The tube is attached to an ordinary fountain syringe by passing the distal end over the smallest rectal tip, which is a part of the outfit of every fountain syringe. The bag should be held not over three feet above the child's body. When the water is allowed to run, the buttocks should be pressed together, for by so doing we hope to flush the entire large intestine. If this can be done, the irrigation will be most efficient.

In this connection I would mention a beneficial effect of irrigation, of which we hear but little, viz., the absorption of a portion of the salt solution by the intestines (page 210). Not a few of the intestinal cases have a very limited food capacity. As a result of the vomiting and very frequent liquid stools, the body is thoroughly drained of fluids. In such cases, after the washing is completed, I endeavor to have the child retain as much as possible of the normal salt solution. As an aid to this, the child should be placed on its left side with the buttocks elevated and the tube introduced well up into the descending colon. The buttocks should be pressed together so as to assist the child in retaining the water after it has passed into the bowel. When a half pint or a pint has passed in, the tube should quickly be withdrawn and the child kept for half an hour in a recumbent position with the buttocks elevated. The salt solution will be best retained when it is used warm, at a temperature of from 100° to 105° F.

INTESTINAL OBSTRUCTION

Agencies impeding or preventing the normal evacuation of the bowels may be either congenital—due to a malformation of some portion of the intestinal tract—or they may be acquired. Congenital malformation may be found in any portion of the tract, but it is most frequently seen at or near the outlet or in the region of the duodenum. Silverman states that 42 percent of the cases of congenital malformation are in the duodenum. When it occurs at the outlet, there may be an imperforate anus, or the absence of, or atresia of, the lower portion of the rectum.

The treatment of this deformity is surgical. The most common cause of acquired obstruction is intussusception (page 223). Peritonitis, both acute and chronic, may cause a cessation of bowel action. Tuberculous peritonitis, through the formation of fibrinous bands and adhesions, may cause sufficient constriction of the gut to prevent the passage of the intestinal contents. In such cases also relief is best

furnished by surgical measures. Acute infective peritonitis (page 491), producing a complete cessation of peristalsis, acts indirectly as a means of preventing the normal passage of the bowel contents. The infection is usually secondary. Operative procedures may be attempted, but all of my cases have been fatal. Two were operated on, as it was feared there might be an intussusception or a volvulus. In one case peritonitis followed pneumonia, the infection being due to the pneumococcus.

Strangulated hernia is a condition by no means difficult of diagnosis and demands prompt surgical relief.

Illustrative Cases.—Fecal impaction was found in two of my cases with intestinal obstruction. Both were seen in consultation. There had been prolonged constipation with insufficient evacuations owing to neglect on the part of the attendants. The duration of the condition it is impossible to state, as the children were permitted to go to the toilet alone, and as both were under five years of age, but little dependence could be placed upon their testimony. In both cases enemata and cathartics had been tried in vain. There was vomiting and slightly distended abdomen. There was no fever and no marked tenderness on pressure. In my opinion, the vomiting was due chiefly to the medication, for it ceased when drugs were discontinued. Both children responded to massage and injections of molasses and water. Eight ounces of molasses and eight ounces of water were introduced by means of a rectal tube at intervals of four hours. One case was relieved after the second injection, the other after the fourth. Massage was early brought into use. This was given for thirty minutes and repeated after an interval of ninety minutes. The interrupted massage was continued until an evacuation occurred.

An unusual case of intestinal obstruction was seen in a wretched, premature infant, five months of age, weighing about seven pounds. The child had a congenital heart lesion and deformities of the ears. It was suddenly taken ill with vomiting and the passage was pale mucus streaked with blood. No tumor could be felt, but a diagnosis of intussusception was made and the abdomen opened. At the site of the obstruction was a Meckel's diverticulum which had twisted the gut so as to prevent the passage of gas or intestinal contents.

Intra-abdominal tumors, such as sarcoma of the kidney and hydronephrosis, may cause obstruction through pressure on the intestine.

APPENDICITIS

Appendicitis in children is so essentially a disease requiring surgical interference, that little need be said of it here. Inflammation of the appendix is a more serious condition in the child than in the adult and less delay in surgical procedure is permissible. There is a much greater tendency toward suppuration than in the adult, because of the presence of a lymphoid structure within the appendix.

Treatment.—Until surgical procedure can be brought into use, the patient should be kept as quiet as possible in bed. Fluid diet in the form of broth and gruel should be given. A saline laxative should be used to keep the bowels open. Citrate of magnesia is palatable and is usually well taken by most children. An ice-bag should be placed over the appendix and kept constantly applied. If for any reason operation is inadvisable or impossible, the broth and gruel diet, the ice-bag, and the recumbent position should be continued until every indication of pain and rigidity of the rectus has disappeared. If the patient has the good fortune to recover, a suitable time should be selected for an interval operation; for a second attack is very liable to follow and is always more severe than the first, abscess formation being very probable. Further, the second attack may occur when the child is otherwise ill, or is away on his vacation or at school, where the necessary surgical skill cannot be obtained.

INTUSSUSCEPTION

Intussusception is such a distinctly surgical affection that, like appendicitis, it requires but little notice here. When there are clinical signs of persistent vomiting with bile-stained vomitus; when there is marked prostration with low temperature; when the stools consist largely of white mucus streaked with blood or perhaps with moderate hemorrhage, all characterized by sudden and severe onset, whether a tumor is present or not, a surgical proposition in a great majority of the cases is before us. Of the fifteen cases I have seen, all but one occurred in well-nourished nursing babies, in whom there had been no previous illness, other than constipation. The youngest nursing baby was two weeks old; the oldest, ten months. The older child was two and one-half years of age. The high mortality reported by the surgeons—from 50 to 80 percent—is due to two factors: the tender age of the patients and the delayed operation.

The cases seen in consultation and those seen in children's hospitals usually had been treated for something other than intussusception. Sometimes such treatment has been continued for several days. By the time these cases reach the hands of the surgeon, there may be extensive adhesions, gangrene of the involved portion of the intestine, and an exhausted child to deal with.

Reduction by Water-pressure.—It is my custom in such cases first to send for the surgeon and then make one attempt at reduction by water-pressure: A well oiled catheter, No. 18 American, or a small rectal tube is attached to the small hard-rubber tip of a fountain syringe. Two quarts of a normal salt solution is placed in the bag, which is hung at an elevation of four feet above the child's body. The colon, or that part of it below the intussusception, is slowly filled with a warm salt solution. A small wet towel is tightly wrapped around

the catheter and fairly strong pressure made at the anus by an assistant in order to prevent the escape of the fluid. With the child on his back with both hands free, the buttocks are elevated on a pillow or bed-pan at a plane ten inches above the shoulders. In the cases in which the tumor is palpable, an attempt is made, by gentle abdominal manipulation, to reduce the intussusception. This in two cases I have thus succeeded in doing.

Illustrative Case.—A child two and one-half years of age was brought to my office at midnight with a history of a severe attack of colic about 9 o'clock, which was followed by severe attacks of vomiting and two stools of mucus and blood. Gentle manipulation of the abdomen showed a large sausage-shaped tumor, about five inches long, in the left hypochondrium, which I diagnosed as an intussusception. The tumor could not be felt by rectal examination. Water-pressure, as described above, with abdominal manipulation, reduced the intussusception in a few minutes. The other case was in a baby nine months of age. I saw the child in consultation after the intussusception had existed for six days. The child was unconscious and in profound collapse. He was pulseless, but the heart-sounds could be faintly distinguished by the aid of the stethoscope. The rectal temperature was 96° F. The abdomen was greatly distended. The child had been treated for cholera infantum, although, for five days, nothing but white mucus tinged with blood had been passed. Palpation revealed a sausage-shaped tumor extending along the entire left side of the abdomen, which in spite of the abdominal distention could easily be made out by firm pressure. The child was unconscious, so that there was no resistance to the examination. By rectal examination the projection of the involuted gut, which resembled the cervix uteri, could readily be distinguished. The condition of the child precluded all chance of surgical relief, and I hesitated to use water-pressure, fearing that the gut might be gangrenous and a rupture result, or that there might be adhesions sufficient to prevent reduction and that the child might die during the manipulations. I explained the situation to the parents, who, after considerable urging, consented to a trial being made. The patient was accordingly given $\frac{1}{100}$ grain of strychnin, one drop of tincture of strophanthus, and thirty drops of brandy hypodermatically. The water-pressure was applied in the usual way, and it was with the greatest surprise and with supreme satisfaction that I felt the tumor slowly give way, to be followed by an expulsion of gas and a quantity of very fetid fecal matter. A hot colon flushing at 110° F. with a normal salt solution was given a few minutes later. This was all retained, and six hours later twelve ounces more were given. Hot-water bottles and bags were placed about the child. He had sufficiently revived in an hour after the first colon flushing to be able to swallow diluted brandy and egg-water, both of which were freely given. A rapid recovery followed.

This case, to me, was interesting in many ways, particularly as it emphasized what we sometimes see in work among children when victory is snatched from the jaws of evident defeat—that we should never cease our efforts so long as life lasts. It is my practice to make but one attempt at reduction by water-pressure. When this does not succeed after a five-minute trial, immediate operation gives the patient his only chance of recovery.

INFLAMMATION OF THE ANUS

An acute painful inflammation of the anus and of the skin surrounding it is frequently seen in children after a diarrhea of some days' duration. It is also seen in weakly, delicate children without any marked intestinal disturbance. The inflammation produces considerable distress during the passage of a stool and is conducive to constipation, because the child soon dreads to have a bowel movement and tries to avoid it. The child's nutrition and management in general must first be carefully looked after, as suggested elsewhere (page 177). For the local trouble, the free use of hot water after each defecation is necessary. This is to be followed by a generous application of an ointment made as follows:

℞. Ichthyoli.....ʒj
Unguenti aquæ rosæ.....ʒj

Instructions are given that the parts are to be kept covered with the ointment, by applying it on a piece of old linen which should be changed every three hours. This treatment is usually followed by prompt relief.

FISSURE OF THE ANUS

Anal fissure is a condition usually seen in quite young children. I have seen comparatively few cases in those over two years of age. Rough manipulation may be a cause, which may result from the unskilled use of the syringe or rectal tube. I have seen one such case. With very few exceptions, however, the fissure is due to the stretching of the parts by the passage of large fecal masses, causing minute lacerations of the mucous membrane within the anal ring. A good light and gentle separation of the buttocks will usually bring the laceration into view. There are few more painful affections. The vigorous crying preceding and during the defecations helps the mother to locate the source of the trouble. Occasionally the fecal mass will be streaked with blood. Caused, as it is, by constipation, the painful nature of the condition tends to delayed bowel action, as the child soon learns to dread a movement, and postpones it until medication or some manipulative means are employed to induce it.

A few months ago a little girl, twenty months old, was brought to me because she cried and objected to being placed in position

for a bowel evacuation, and cried much harder during the evacuation. The day preceding the visit to my office the mother feared that the child would have a convulsion, so great was her distress. Examination of the rectum showed two rather small fissures extending through the anal mucous membrane.

Treatment.—*Diet.*—For a prompt repair of the fissures, it is necessary to render the stools soft. This, in the bottle-fed, is often easily accomplished by the addition of one of the malted foods, either Mellin's food or malted milk—one or two teaspoonfuls being added to the regular milk mixture—or one feeding of malted milk each day may be substituted for one of the regular feedings. It may be used in the strength of four to six teaspoonfuls in eight ounces of water.

Drugs.—If drugs are necessary or are preferred, one or two teaspoonfuls daily of the milk of magnesia given in the milk food will answer well. A teaspoonful of sweet oil after two or more feedings will usually have the desired softening effect upon the stool.

Local Measures.—Proper regulation of the bowel function, while absolutely necessary for a cure of the laceration, is not of itself sufficient to effect permanent relief. The parts must be thoroughly washed with warm water and castile soap after each defecation. After the washing, and at three-hour intervals during the day, 25 per cent of ichthyol in zinc ointment should be applied with a clean index-finger, which is introduced well up into the anal aperture. If the fissure is a deep one, it will be well to begin the treatment by cocainizing the parts, using a 3 percent solution of cocain, and then cauterize with a 50 percent solution of nitrate of silver, which is applied on a cotton-tipped probe. Twelve hours later the ichthyol ointment may be used as in the milder cases. I have yet to see a case which did not respond to the above treatment if it was faithfully carried out.

THE INTESTINAL PARASITES

The most common of the intestinal parasites found in children are of three types: Ascaris lumbricoides, or round-worm; the Oxyuris vermicularis, or thread-worm; the Tænia, or tape-worm.

Round-worms.—The round-worms, if in considerable number, may produce colic or constipation, the latter oftentimes alternating with diarrhea and with nervous disturbance, sometimes of an urgent character. In the great majority of my cases, however, no symptoms whatever were present, and the fact that the child had parasites in the intestine was first learned when one was found to have been passed by the rectum. In one of my cases, in a child three years of age, there had been repeated convulsions. The mother stated that the child had passed a couple of round-worms the day before. I gave one-half ounce of castor oil, which was followed, in one hour, by two grains of santonin. Forty-three large round-worms were passed during the next twenty-four hours.

This is the largest number that I have known to come from one child. The round-worm is rare in New York city children. I have seen but five cases. In children who live in the country it is of fairly common occurrence.

My treatment is as follows: At bedtime I give from two to four teaspoonfuls of castor oil. Early the following morning, about two hours before breakfast, santonin is given. For children under two years of age, I give one grain; for those from two to four years of age, one and one-half grains; after the fourth year, two grains may be given. It is prescribed in a powder with an equal quantity of sugar of milk, or in capsule. If the passage of worms follows its use, the treatment is repeated in three days, and again in a week, if worms are passed after the second treatment.

Thread-worms.—Thread-worms or pin-worms are more frequently seen in city children than are either round-worms or tape-worms. They produce an irritation and itching about, and a pricking sensation within, the anus which is bitterly complained of after the child is in bed for the night, the parasites being particularly active at this time. If there is any doubt as to their presence, the patient should receive a full dose of castor oil—at least two teaspoonfuls. The discharges should be kept for inspection. If the parasites are present, they will be seen in the form of pieces resembling white thread, from one-fourth to one-eighth inch in length. They will usually be found embedded in a considerable quantity of mucus.

Treatment.—*Drugs.*—Santonin, recommended by some writers as of service in these cases, has been without the slightest value in my hands. In fact, the use of drugs of any kind seems to be of very little service. After the third year, turpentine in one-drop doses after meals is probably the most valuable internal medication. It may be given in emulsion or dropped upon sugar.

Rectal Injections.—Local treatment with the infusions of garlic or quassia must be our principal reliance in the management of these oftentimes obstinate cases. In patients in whom the worms have existed for a considerable time, the resulting irritation will cause a profuse secretion of mucus in the descending colon and sigmoid. This mucus must be washed out before any direct treatment can be brought to play upon the parasite. The colon is first irrigated with a solution of one tablespoonful of borax to a pint of water. For this purpose a No. 18 American catheter should be used, as in colon flushings. The tube should be introduced for at least ten inches. No attempt is made to have the solution retained. The child is encouraged to bear down and expel the water alongside of the tube. After the washing is completed, eight ounces of the infusion of quassia is passed into the colon. To facilitate its retention the tube is quickly withdrawn, and the child placed on his left side with the buttocks elevated on a pillow. This position, or at least the recumbent position, should be maintained for one-half hour

after the injection is given. A solution of the bichlorid of mercury 1 : 10,000 may be used in the same way. For ordinary family use, however, I consider either the garlic or the quassia much safer and equally effective. Garlic is particularly effective, but its very disagreeable odor makes its use objectionable in many households, and therefore I advise it only when other means fail. After the worms and the evidence of their presence disappear, the treatment should be continued for a time on alternate days, and then twice a week, gradually reducing the frequency of the irrigations until they are no longer required. Few cases recover in less than four weeks, and in many it will be necessary to continue the treatment for months. I have never seen a case, however, which did not eventually respond to persistent treatment.

The Tape-worm.—The tape-worm may produce symptoms of disturbed intestinal digestion, such as colicky pain and diarrhea. Usually, however, the first warning that the child is affected will be the passage of segments of the worm.

A worm fourteen feet in length was passed, after treatment, by a little girl four years old. There had never been a symptom of its presence other than the passage of several of the segments.

The treatment is as follows: At bedtime give one-half ounce of castor oil. Early the next morning, two hours before breakfast, give one-half dram of the oleoresin of male-fern (aspidium) in emulsion or in capsule. During the day a light fluid diet only is to be given, such as broth, gruels, and fruit-juices. One treatment with a good preparation of the male-fern will usually bring away the worm entire. The head should be carefully searched for with a magnifying glass. If it is not found, the treatment should be repeated after an interval of twenty-four hours.

PROLAPSE OF THE ANUS AND RECTUM

In anal prolapse there is an eversion of the mucous membrane, a condition often present in constipation and sometimes seen in diarrheal conditions of the dysenteric type, in which there is apt to be considerable tenesmus and straining. If the case is neglected, the prolapse occurring repeatedly for many days in succession in cases of constipation, or several times a day in the acute intestinal cases, the sphincter gradually becomes weakened, the prolapse more pronounced, and soon a considerable portion of the involuted rectum appears with each defecation.

Cases of simple eversion are usually relieved by controlling the diarrhea, or, when due to constipation, by supporting the perineum during defecation. This support is best furnished by wrapping a considerable quantity of absorbent cotton around the index-finger, which rests against and supports the perineum. The child should lie on its back during defecation. The troublesome cases are those due to constipation in "runabout" children, where the prolapse has been

repeated every day for several months. Such children usually show evidence of illness other than the local conditions and the constipation. They are usually underfed and poorly nourished. Many are rachitic or show the ear-marks of a previous rachitic state.

Operation Contraindicated.—The reduction of the prolapse can usually be readily effected by pressure on the protruding mass with absorbent cotton which has been dipped in warm sterilized olive oil. The only means of permanently curing prolapse of the rectum and anus, is effectively and at once to prevent the recurrence. Operation by removing sections of the mucous membrane, thus narrowing the rectal outlet, the use of the actual cautery or of nitrate of silver, is unnecessary according to my observation. Oftentimes such operations are productive of much harm. They are unnecessary, because the case will get well with much simpler means; and harmful because of the pain and the days of discomfort which may follow such procedures, to say nothing of the dangers of infection and the possibilities of resulting stricture and deformities of the parts.

Treatment.—*Hygienic.*—In undertaking a case of habitual prolapse of the rectum it is necessary that the child be put in the most favorable physical condition. As these children are usually constipated, the diet advised for the constipated (page 182) should be used. If thread-worms are present as a cause, the treatment should be directed toward their removal. If the child is anemic or rachitic, means must be employed to bring the physical condition up to the highest possible standard.

Postural.—When we have properly prepared the patient, by thus carefully attending to his general condition, we are in a position to relieve the prolapse. We begin as follows: At bedtime introduce into the colon four ounces of warm sweet oil (page 185). This will rarely cause an evacuation. In case this should happen, only one or two ounces should be used. The following morning, after the first meal, the child is placed in a recumbent position on a bed-pan with the buttocks elevated to a plane at least four inches higher than the child's shoulders. In order to establish the habit of a daily evacuation at a proper time, a glycerin suppository, infant size, is inserted. If an evacuation does not take place within a few minutes, eight ounces of soap-water should be introduced. After a few days of the suggestion afforded by the preparation, the position of the patient, together with his natural efforts toward a movement of the bowels, will render artificial stimulation unnecessary. The advantages of postural treatment are obvious. By lessening the abdominal pressure, which is much greater when the child is in the upright position, much less force is exerted on the weakened structures, and the patient is in a position in which the attendant, by suitable perineal support, by pressing the buttocks together, may better prevent the prolapse. If the case is a severe one, the recumbent position for each daily evacuation must

be continued for six weeks or longer before the defecation is allowed to occur with the child in the sitting posture. If later the prolapse is repeated, four weeks more of the postural treatment must be carried out.

Supplementary.—After the child is apparently cured, the bowel function must be carefully watched for months; twenty-four hours should never pass without a movement. If a laxative is necessary, as, in a few cases, it will be, two or three teaspoonfuls daily of the milk of magnesia given in the child's milk affords a satisfactory laxative, as it produces a soft stool and does not have a pronounced effect upon intestinal peristalsis. Two or three teaspoonfuls of olive oil given after each meal will often produce the desired laxative result. At the same time it is no small addition to the child's nourishment.

The child at first may not take kindly to the postural treatment; but after a reasonable amount of coaxing and bribing, he soon becomes accustomed to it. I have never had any trouble in having the directions carried out, because of the objections of the child.

ISCHIORECTAL ABSCESS

An abscess of this type is occasionally seen in infant asylums, babies' hospitals, and in out-patient work. It is usually found in ill-conditioned children. Such an abscess is generally the result of an infection of the lymph-glands in the neighborhood of the rectum. As a rule, the abscess is not deeply situated and its cure is easy.

All that is required is a free incision, a daily washing out of the abscess cavity with a 3 percent solution of hydrogen peroxid and packing with sterilized gauze moistened with a saturated solution of boric acid. A layer of gauze, covered with oiled silk, should cover the dressing to protect the wound from further infection from the fecal discharges. In case the granulations are sluggish, as they may be in marasmic infants, the gauze used for the packing may be saturated with the balsam of Peru.

HEMORRHOIDS

While a comparatively rare condition in children, hemorrhoids are occasionally seen. Constipation and neglect of cleanliness appear to have been the cause in most of my cases. The treatment is to relieve the constipation and carefully cleanse the anus with hot water and soap after each movement of the bowels, after which an ointment composed of the following ingredients is applied:

℞. Acidi tannici.....gr. x
Pulveris camphoræ.....gr. v
Ichthyoli.....℥iss
Unguenti zinci oxidi.....q. s. ad ℥j

The ointment, in addition to its use after an evacuation of the bowels, should be generously applied to the anus, night and morning, after washing.

RECTAL POLYPUS

According to my observation, rectal polypus is a rare condition. My cases have been three in number and in children between the ages of five and seven. In all these cases the polypus was discovered by the mother after the child's evacuation of the bowels. It may easily be recognized as an oval, deeply congested tumor protruding from the anal orifice.

In these children there had been slight hemorrhage from time to time with the evacuations, the feces being streaked with blood. The polypi, in these cases, were easy of diagnosis, as they were situated low down on the rectal wall, each with a rather narrow pedicle. They were readily ligated and removed.

Repeated bleeding from the rectum in apparent health should always suggest the possibility of a polypoid growth. Hemorrhoids also are very rare in young children. Pain and tenesmus are early signs of fissure, so that bleeding from such a source may readily be accounted for.

INCONTINENCE OF FECES

Incontinence of feces is a normal condition during infancy, control being established without training during the second year or earlier. In well-trained infants I have seen the bowel function under perfect control at the third month. This is unusual, however. Still, with a very little teaching it may be accomplished at the sixth month. Incontinence of feces in older children occurs during acute inflammatory conditions, particularly when the colon is the seat of the lesion. It may also be present in asthenic states, as in grave pneumonia, in typhoid fever, and in severer types of the exanthemata, and it may occur accidentally as the result of a fright, shock, or of severe straining.

Incontinence of feces, as a condition independent of the age element and illness, is of exceedingly unusual occurrence. I have seen but two cases—both boys, one four and the other seven years of age. In both, the condition had persisted for months. The desire for an evacuation in these cases came with great urgency and was uncontrollable. There was no diarrhea or evidence of any intestinal lesion. One was a dispensary patient, the other was seen in private. Both were wretchedly nourished children, both had been badly managed and badly fed. Incontinence rarely occurred at night. During the day, however, it sometimes took place two and three times. The patients were on a general mixed diet.

The treatment was the removal of green vegetables and fruit from the diet, allowing only a small amount of starches, such as bread, potato, and cereals; eggs, meat, fish, skimmed milk, junket, custard, etc., were given freely. Medically they were given fifteen drops of the tincture of the muriate of iron in glycerin and water every four hours, with one grain of Dover's powder and twenty grains of subnitrate of bismuth (Squibb) three times daily. Both cases recovered completely, one in three weeks, the other in five.

THE MOUTH, THROAT, AND NOSE

STOMATITIS

The term *stomatitis* is applied to an inflammation of the mucous membrane of the mouth. Three types are usually described by pediatric authors—the *catarrhal*, the *aphthous*, and the *ulcerative*. This division is perhaps more the result of the habit of copying from former writers than from clinical observation. Among several thousand out-patient, institution, and hospital patients, it has been my privilege to treat many cases of stomatitis.

There are many cases of catarrhal stomatitis which under treatment go no further; other cases, with or without treatment, go on to the development of aphthæ, or to an ulcerative condition, or both conditions may be combined. Many cases, when they appear for treatment, have the so-called aphthous spots already developed, but the condition described as "catarrhal stomatitis" is present also. Other cases when they come to us show marked ulceration, but never without catarrhal symptoms.

The first symptom of a stomatitis is a superficial catarrhal inflammation of the mucous membrane of the mouth. There is a redness and injection of the gums. If "aphthæ" develop, small grayish plaques appear on the mucous surface of any portion of the buccal cavity. In mild cases there may be but three or four areas. In a case of moderate severity the mucous membrane of the gums, the hard and soft palate, and the inner side of the cheeks will be studded with ulcerated grayish-white areas, in size from a pinhead to a split pea. Occasionally the areas coalesce, forming larger plaques of a serpiginous type.

Ulceration ordinarily does not appear until after the catarrhal condition has been present for at least three or four days. It will first be noticed as a faint yellow line at the margin of the gum where it joins the teeth. This is the commencement of what Virchow describes as "necrobiosis." Ulceration never occurs unless teeth are present. I have never known a case to go on to ulceration in a baby fed entirely at the breast. Whether the case remains simply catarrhal, or whether aphthæ or ulceration or both result, certain symptoms are common to all. There is a marked increase in the flow of saliva, which, in some cases, may be said to stream from the mouth, running down over the chin and soiling the clothes. On account of its acid properties it causes an irritation of the skin, producing an eczema. The mouth is hot and painful. Fever is present in a slight degree, both when

the condition is simply catarrhal and when aphthæ are present. There is but little prostration and the child appears but slightly indisposed. In cases which go on to ulceration, the fever may be very high. I have frequently seen it at 104° F. or over. In one case it reached 107° F. No cause except the ulcerative stomatitis could be found for the fever. Under properly directed treatment, the child recovered in a few days.

On account of the pain occasioned by drawing on the nipple, nutrition may be considerably interfered with in these cases. The child takes the breast or bottle greedily, draws a few times, stops and begins to cry. If urged to try again, the process is repeated. The pain appears to be particularly severe when aphthæ are present. The advent of ulceration will be indicated by a change in the breath, which becomes disgustingly foul. The gums are thick, spongy, and bleed easily, and in some cases overlap the teeth very early in the ulcerative stage. If a case has been neglected or improperly treated, which was the history of not a few of my dispensary patients, the ulceration was often so extensive that the teeth became loose as a result of the destruction of the gums, and their removal was necessary. Strong, vigorous children are as susceptible to the disease as are the rachitic, the badly fed, or the generally delicate.

The cause of the disease is unquestionably an infection, and there is no doubt that it is contagious. As to the nature of the infection, positively nothing is known. The combined action of several varieties of microörganisms is the most plausible explanation. I have known it to go through an entire family of several children. Authors are prone to attribute the trouble primarily to mechanical irritation, such as careless manipulation during the mouth toilet; but the majority of my cases when they applied for treatment had never been accustomed to mouth toilets of any kind. The giving of overheated food is supposed by some to be a causative agent. If this were the case, 75 percent of the infants among the poorer classes would never be free from the disease. The food of bottle-fed children unless carefully watched is almost invariably given too hot. The disease, however, is not limited to dispensary patients. I have seen many cases among the well-to-do. Where gross uncleanliness is the family habit, the number of cases of stomatitis will, for obvious reasons, be greater; there are more bacteria to carry infection. Children whose mouths are carefully cleaned after each feeding, do not develop stomatitis. To teach that a child's mouth should not be washed because an indifferent doctor may fail to instruct the mother or nurse as to how it should be done is rank heresy. When errors of the mother or nurse occur in performing the various offices for the child, it is my observation that, nine times out of ten, it is due to the lack of teaching by the careless

physician. The mouth may be very effectually cleansed without injuring the mucous membrane in the slightest degree.

Treatment.—*Mouth-washing.*—When the stomatitis is catarrhal or aphthous, preventive treatment—the washing of the mouth after each feeding with a saturated solution of boric acid in boiled water—is also curative. A baby's mouth should be washed as follows: The child is placed on its side or on its stomach, the index-finger of the mother or nurse being thoroughly wrapped in absorbent cotton. The finger is then dipped into the solution, and without expressing the fluid it is placed in the child's mouth. By gentle pressure upon the gums and cheeks a sufficient amount of the fluid will be expressed to run out of the mouth and effectually cleanse it. The washing is assisted by the opposition offered by the child to the manipulation of the tongue, cheeks, and jaws.

Drugs.—Internal medication is of no value so far as concerns the stomatitis, except indirectly. If there is a disordered digestive tract, it should receive attention by diet and saline laxatives. Calomel should not be given. Whether the condition was catarrhal or aphthous, I have never found it necessary to use other means than the free mouth-washing. Astringents and caustics have never been necessary. The cases usually recover in from four to seven days, under strict attention to cleanliness as regards the feeding apparatus in the bottle-fed, or the mother's nipple in the nursling, together with the free use of the boric acid solution as a mouth-wash.

Feeding.—The food problem is oftentimes a difficult one to deal with, particularly in nurslings, on account of the pain caused by drawing on the nipple, the child refusing absolutely to nurse. In some cases it may be necessary to draw the milk with a breast-pump, and for a day or two feed the baby with a spoon. In the bottle-fed, spoon-feeding may also be resorted to. The child will take the nourishment much better if it is given cool. Small pieces of ice and teaspoonful doses of cold water are taken eagerly.

Treatment after Ulceration.—With the development of ulceration a change in the management is necessary, both as regards a mouth-wash and the necessity for internal medication. Among the local measures hydrogen peroxid as a mouth-wash, one part of a 3 percent solution in two parts of water, used after each feeding, has given the best results. Such means, however, are rarely necessary if the case is seen early. I never employ other than the usual means of cleanliness—the boric acid solution—except in cases that show a considerable destruction of tissue.

Chlorate of Potash.—In the internal administration of chlorate of potash we have what is practically a specific in this disease. Its administration should be commenced as soon as the condition is recognized. I usually prescribe it in the syrup of raspberry, using one part of the syrup to two parts of water. For a child under eighteen months

of age I order two grains at intervals of two or three hours, not more than ten grains in twenty-four hours. For a child from eighteen months to three years of age, two or three grains at the same intervals, not more than fifteen grains in twenty-four hours. With the above dosage it will be necessary, in the average case, to continue the drug from three to five days. Very often, after the improvement is well marked, I reduce the dose one-half and continue it for three or four days longer.

Much has been written as to the danger of the internal use of chlorate of potash in children, particularly in relation to its effects upon the kidneys. If the use of the drug in suitable doses were of special danger in this respect, the free use of the chlorate of potash and iron mixture, so extensively prescribed in diphtheria in the pre-antitoxin period, would have been universally condemned. I have never seen any unpleasant effects from its use when given in doses from ten to twenty grains daily, and I have used it in many hundreds of cases of acute inflammatory conditions of the throat and mouth.

SPRUE; THRUSH; MYCOTIC STOMATITIS

Thrush consists of a parasitic growth which appears on the mucous membrane of the mouth in young infants. Plaut, in his classification of diseases of the mouth, calls it a fungous growth, *monilia candida*. The disease makes its appearance in the form of small white masses about the size of a pinhead. The tongue and the inner side of the cheeks are favorite sites for the growth, although in severe cases the entire buccal cavity may be studded with it, causing it to look as though finely curdled milk had been scattered over the surface. The growth is firmly adherent, and if removed forcibly, slight bleeding results. It is invariably associated with uncleanliness, and occurs, as a rule, in weakly and marasmic nurslings and in the bottle-fed, more frequently in the latter. It is rarely seen after the sixth month.

In an infant with sprue, there is evidence of much pain and discomfort while nursing or while feeding from a bottle. The disease is not contagious. The average case may easily be cured in a week, if the directions for the treatment are carefully carried out. Active gastro-enteric disturbances, such as vomiting and diarrhea, may be associated with sprue, but it is not the rule. Time and again I have seen cases of sprue in which there were absolutely no other signs of the disease aside from the characteristic mouth lesions and the refusal of food.

If the means of prophylaxis, which will be suggested, are used as the daily routine, the disease will never appear.

Treatment.—If breast-fed, the mother's nipples must be washed with a saturated solution of boric acid and moistened with alcohol,

diluted one-half, which is allowed to evaporate before each nursing. If bottle-fed, the nipple and bottle should be boiled after each nursing, the nipples turned inside out and scrubbed with borax water—one ounce of borax to a pint of water. Whether breast-fed or bottle-fed, the mouth should be washed with a saturated solution of boric acid after each nursing. For this purpose a generous amount of absorbent cotton is loosely wrapped around the clean index-finger of the mother or nurse. This is placed in the cold solution, and without pressing out the water the finger is introduced into the child's mouth, and, in cases of sprue, brought gently in contact with the diseased parts, first with one side and then with the other, being pressed upon the tongue and under the tongue. It is well to have the child rest on its side or stomach so that the fluid which is pressed out by the manipulation of the cotton against the cheeks and jaws can readily escape from the mouth. The washing, which really amounts to an irrigation, can be done in a few seconds, without the slightest danger of abrading the epithelium. In obstinate cases, the parts may be penciled once a day with a 1 percent solution of formalin, in addition to the other treatment.

Internal medication is of no value in sprue except in correcting any intestinal derangement that may exist, with a view to improving the general condition. If the bottle or breast is refused, spoon-feeding for a few days may be necessary, and will hasten a cure. If the child is nursed, the mother's milk may be drawn with a breast-pump (see page 79) or pressed out with the fingers and fed to the child. The domestic remedy, honey and borax, should not be used in any of the inflammatory diseases of the mouth in children.

CANCRUM ORIS; NOMA

This disease is unquestionably the work of a specific microbe, the nature of which is unknown. The site of the disease is usually the inner side of the cheek; either one or both sides may be involved. The gangrenous process usually begins as a small, inflamed, infiltrated area in the mucous membrane opposite the teeth. Destruction of tissue, distinctly localized, follows and extends with great rapidity, the tissue sloughing away in masses. The parts for some distance around the ulcer are hard, infiltrated, and discolored, presenting an inflamed edematous look. After two or three days a discolored, ecchymosis-like area will be noticed on the outer side of the cheek, corresponding in location to the gangrenous process within. At this point the ulcer soon perforates. The destruction of tissue continues quite symmetrically around the ulcer until the whole cheek is destroyed. The gangrenous process not infrequently involves the bony structure, causing necrosis of the jaw with a loosening and falling out of the teeth. A symptom which will never fail, and can never be forgotten by one who has seen even

one of these cases, is the almost unbearable stench which emanates from the patient. When the hands or the fingers of the physician or nurse come in contact with the gangrenous slough, it is well-nigh impossible to remove or neutralize the disgusting odor. The disease usually occurs in weakly, marantic children, who generally die from exhaustion and sepsis in ten days or two weeks from the onset of the disease.

Treatment.—The treatment pursued has been the use of free cauterization with nitric acid, chemically pure, and disinfectant wet dressings of bichlorid 1 : 2000; a saturated solution of boric acid; or equal parts of alcohol and water. The latter is apparently more effective in staying the progress of the disease than is either the bichlorid or the boric acid solution. On account of the rapid evaporation, it should be applied on two or three layers of lint and covered with rubber tissue. Even then it requires very frequent renewals. Hydrogen peroxid may be used to cleanse the ulcer, both before and after perforation. Hemorrhage is rarely a complication. The disease is usually fatal, even under the best management.

BEDNAR'S APHTHÆ

What is known as "Bednar's aphthæ" is not an aphtha, but an ulcer. Among the many cases I have seen, not one was in a child over four months of age. It is most often seen in poorly nourished children.

The disease, when well developed, consists of a "punched-out" appearing ulcer which is seen on the hard palate, usually, but not invariably, at its posterior portion. I have in but one case seen two ulcers present at the same time—one on either side of the mesial line. As a rule, the process is limited to one side of the hard palate. All the cases seen by me were in bottle-fed children, usually those fed with a long nipple, or those using a "pacifier," a cork-plugged nipple, or some other sucking apparatus. The cases always appeared to be due to a prolonged mechanical irritation. The ulcer caused no other symptoms than interference with feeding. The patient is usually brought for treatment for this reason. The child appears lively, but refuses the bottle after an attempt at nursing. The mother examines the child's mouth, discovers the ulceration, and brings the child with a story of an inability to take the bottle. An examination of the mouth shows the presence of the characteristic ulcer.

Treatment.—As short a nipple as is practicable should be brought into use, or, what is better, the child may be fed with a spoon for a few days, for as long as the local irritation is continued improvement is impossible. The local treatment consists in washing the mouth with a saturated solution of boric acid (see page 236) after each feeding, and the application to the ulcer once daily of a 50 percent solution

of nitrate of silver. This is best accomplished by means of a toothpick, one end of which is wrapped with absorbent cotton, the child resting on its back on the nurse's lap or on a table. The nurse holds the child's arms to its side while the physician, with his left hand, separates the jaws with a spoon or a tongue-depressor, and with his right, the child being thus under perfect control, the application can easily be made. The ulcer should thus be treated daily for four or five days until it has healed.

FISSURES OF THE LIPS

Deep cracks and fissures in the lips are of quite frequent occurrence among out-patient children. Usually the lower lip is involved, and in many of the cases there will be but one deep fissure and that about the middle of the lower lip. Marasmic, ill-conditioned children are the most frequent sufferers. The fissures bleed easily and occasion considerable pain while nursing. As a result, less food is taken than the child requires. If the fissure is a deep one, it will be well to apply a 50 percent solution of nitrate of silver at the commencement of the treatment. This is to be followed by frequent applications—three or four times daily—of a 25 percent solution of ichthyol. Healing is usually prompt, requiring but a few days. If the mucous membrane of the lip generally is dry and fissured, as in cases of prolonged illness with fever, the frequent use of a 5 percent boric acid ointment, made with cold-cream as a base, will be of material assistance in controlling the condition.

ULCERATIONS AND FISSURES AT THE ANGLE OF THE MOUTH

Ulcerations and fissures at the angle of the mouth are by no means uncommon in delicate and marasmic infants. While ulceration in this location is one of the manifestations of congenital syphilis, such ulcers are not necessarily syphilitic. The condition, however, is of sufficient importance to require treatment, because the affection is so painful as to prevent the taking of adequate nourishment. Painting the fissure with a 25 percent solution of ichthyol every three hours during the day will insure the prompt healing of the fissures.

ULCER OF THE FRENUM OF THE TONGUE

An ulceration of the frenum of the tongue, "the tongue bridle," is rarely seen in well children. It is rounded, grayish in appearance, with a slightly raised border. It usually occurs in infants who are suffering from whooping-cough, bronchitis, or bronchopneumonia. It is never seen except in children who have the lower incisors well through, the ulceration being due to contact of the frenum with the sharp teeth during the protrusion of the tongue in coughing. The ulceration may cause some difficulty in nursing;

it may be necessary to feed the child with a spoon for a day or two; the condition is, however, rarely of a serious nature.

The presence of the ulcer is usually discovered by the mother while attending to the mouth toilet. The application of a 50 per-cent solution of the nitrate of silver and the use of a saturated solution of boric acid as a mouth-wash after each feeding will quickly relieve the condition.

GEOGRAPHIC TONGUE

The condition known as a "geographic tongue" consists of smooth, distinct, reddish patches on the tongue's surface, the areas being surrounded by a light grayish, narrow, raised border. The smooth surfaces comprising the involved areas are devoid of epithelium; the borders are composed of hypertrophied papillæ which take on a grayish color, making a distinct framework for the reddish areas, which are almost always crescentic in shape. This peculiar marking has given rise to the term "ringworm of the tongue." Geographic tongue is seen most frequently in children under three years of age, and occurs as often among the strong and vigorous as among the delicate and weakly. The condition is usually discovered by the mother, who, with much agitation, brings the child to the physician. It does not appear to be due to and is usually not associated with any disturbance of the gastro-enteric tract. The portion of the tongue which is not involved appears perfectly normal.

Treatment of geographic tongue is unnecessary, as it causes no symptoms and apparently is independent of any disease. It is my custom to assure mothers that the condition is of no consequence. It usually disappears in a few months. I have known a case to last for a year.

TONGUE-TIE

Tongue-tie is a condition caused by the extension of the frenum forward, nearly if not quite to the tip of the tongue. It interferes somewhat with nursing if the milk is hard to draw, and interferes generally with the free action of the tongue.

The treatment consists in dividing the frenum with curved scissors. The child is wrapped in a large towel binding its arms to its sides. It is placed on its back on the nurse's lap or on a table. It is best controlled when supported by the nurse with its head between the physician's knees. The head can thus be steadied, leaving both hands free for the operation. A grooved director, while not necessary, makes the operation safe and easy. The frenum is fixed in the slit in the broad end of the director which rests against the tongue. This raises the tongue and puts the frenum on a tension, and the division with the curved scissors is a simple matter. Bleeding is usually so slight that it need not be considered.

DISEASES OF THE RESPIRATORY TRACT

TAKING COLD

By "taking cold" we understand that through the influence of cold there is produced upon some portion of the skin an impression similar to that of shock. This impression affects the entire body and manifests itself most frequently in the form of a congestion of the mucous membrane of the respiratory tract, between which and the skin there seems to be an intimate connection. Micro-örganisms play an important rôle in the process. They are found in large numbers on the diseased mucous surfaces. The changes in the mucous membrane resulting from exposure prepare it for their growth and development. "Taking cold" means previous exposure, and what will constitute a sufficient degree of exposure in one child may produce no effect in another. According to my observation the most frequent cause of colds in infancy is the effect of cold air on a moist skin. The child that perspires readily, or the child that is made to perspire by unsuitable clothing, suffers most in this respect, during the cold season.

I look upon inadequate head-covering as a most frequent cause of diseases of the respiratory tract in the young. Usually in the country during cold weather, an infant is dressed for the daily outing in a warm room with the temperature ranging from 70° to 80° F. He is wrapped in ample coats, blankets, and leggings. The child is active, throws his legs and arms about, and the dressing thus far having consumed considerable time, he perspires freely, but still the dressing is not completed. On the head is placed one of the more or less artistically decorated airy creations which are sold in the shops as children's caps. They furnish little protection for the many square inches of the almost bald little head. The child is taken out of doors while the wind is blowing and the result is a cold, and how it came about is never understood! He was supposed to be dressed ideally for cold weather. The notion is common, and to a certain extent proper, that a child's head should be kept cool. This theory, however, gives rise to carelessness as to the head-dress. During the colder months, as an extra protection, I advise mothers to make a skull-cap of thin flannel, for the child to wear under the regular outing cap.

Allowing a child to sit on the floor during the winter months is probably the next most frequent cause of his taking cold. Kicking off the bedclothes at night is another frequent cause. Taking

the child from a warm room through a cold hall is not without danger. Holding the child for a few moments by an open window during the cold weather is often followed by croup, bronchitis, or pneumonia. The uneven temperature of the living-rooms and sleeping-rooms in many of our apartment homes is a very common cause of cold. Frequently during the day the temperature will be between 75° and 80° F., but at night, when the fires are banked, it falls to 55° or 60° F. or lower. The child went to bed perspiring, kicked off the bedclothes, the temperature in the room fell, the body became chilled, and the child took cold. The temperature of the living-room should range from 70° to 72° F., the sleeping-room from 60° to 65° F. Of course, it will be impossible to keep the temperature at all times at these figures, but the closer we approximate to them, the safer the child will be. In many instances, colds in infants are attributed to the bath. Among dispensary mothers this is often considered a cause of cold. I have never known a cold to be due to a bath, although, of course, when carelessly given, such a thing is possible.

Among rachitic and rheumatic children there is a marked predisposition to catarrhal affections; they acquire laryngitis and bronchitis upon very slight provocation. Adults and "runabout" children with coughs and colds should not come in contact with infants. There is undoubtedly an element of contagion in such cases. It is a very bad practice to have a "family pocket-handkerchief." The youngest infant is entitled to a handkerchief independent of the other children, and one handkerchief should never do service for more than one individual. Children should not be allowed to sit on the floor during the winter. They can have their playthings on the bed, on the sofa, or, for those under one year, in a clothes-basket which may be raised on two thick pieces of wood or a couple of books. There is always a draft near the floor. The "pen" referred to on page 38 is the best scheme that I know of for keeping children from the floor.

The room in which the child is dressed for an outing should not be above 70° F., better below it. Securely pinning bed-blankets to the mattress, or preferably a combination suit with "feet," will do much to prevent taking cold at night.

ACUTE RHINITIS (CORYZA; SNUFFLES; COLD IN THE HEAD)

Acute rhinitis is a very common ailment throughout childhood. Newly born babes, "runabouts," and school-children are alike sufferers. The onset is usually sudden, with sneezing and with difficulty in breathing through the nose. This may continue for a few hours, in some cases for a day or two, when a mucous, watery, nasal discharge appears. On account of its interference with nursing, infants are the greatest sufferers; breathing, which has to be carried

on largely through the mouth, is difficult, and nursing, in consequence, frequently interrupted. There may be a degree or two of fever at the commencement of the attack, but, as a rule, it lasts only a few hours. Neglected cases sometimes become infected with pyogenic bacteria and a troublesome purulent rhinitis results. In the majority of the neglected cases, however, and in some of those that are well treated, this is the beginning of an inflammatory process which involves successively the fauces, tonsils, larynx, and bronchi. Repeated attacks doubtless aid in the production of adenoid growths in the nasopharyngeal vault.

Differential Diagnosis.—Acute simple rhinitis is to be differentiated from specific rhinitis, which, as is well known, is one of the first manifestations of congenital syphilis. When due to syphilitic infection, the condition is uninfluenced by the usual treatment. There is no tendency for it to descend and involve the mucous membrane of the bronchi. The hoarseness of congenital syphilis is chronic and of gradual development. Furthermore, if the rhinitis is due to syphilis, other signs are present, or will soon appear, which will make the diagnosis possible. Measles almost invariably begins as an acute rhinitis. The accompanying conjunctivitis, the hard, dry, hacking cough, and the characteristic rash soon make the diagnosis possible. In nasal diphtheria there is invariably a discharge from the nose which may be differentiated from simple rhinitis by the fact that the discharge in diphtheria is excoriating in character and is often tinged with blood. A diphtheritic discharge may be limited entirely to one nostril or may be greater from one nostril than the other; while in acute simple rhinitis the amount of the discharge is usually the same from both sides. The tendency in acute simple rhinitis in a strong child is toward recovery in five or six days. When the surroundings are unfavorable, or in delicate, rachitic children, active treatment will be required to bring about a prompt recovery.

Treatment.—In the first stage, that of engorgement, much may be accomplished in the very young by local measures—menthol, one-half grain, dissolved in one ounce of liquid albolene. Of this solution three drops are instilled into each nostril every hour by means of a medicine-dropper. This treatment alone will relieve the patient of a distressing obstruction, thus opening the way to freer breathing. In older children a spray containing one grain of menthol to an ounce of liquid albolene may be used at intervals of two or three hours.

In case menthol and albolene are not at hand, melted white vaselin may be used in the same way.

For internal use the following medication has served me well:

For a child three months of age:

℞. Tincturæ belladonnæ.....gtt. vij
Pulveris camphoræ .....gr. iv
Sacchari lactis, q. s.
M. div. et ft. tablets No. xxx.
Sig.—One tablet every two hours.

Six months of age:

℞. Tincturæ belladonnæ .....gtt. x
Pulveris camphoræ.....gr. v
Pulveris Doveri.....gr. iv
Sacchari lactis, q. s.
M. div. et ft. tablets No. xxx.
Sig.—One every two hours in water.

From one to two years of age:

℞. Tincturæ belladonnæ.....gtt. xv
Pulveris camphoræ.....gr. vj
Pulveris Doveri.....gr. x
M. div. et ft. tablets No. xxx.
Sig.—One every two hours.

At least six doses should be given in the twenty-four hours.
From two to four years of age:

℞. Tincturæ belladonnæ.....gtt. xv
Pulveris camphoræ.....gr. vj
Pulveris Doveri.....gr. xv
Sacchari lactis, q. s.
M. div. et ft. tablets No. xxx.
Sig.—One every two hours.

If for any reason the tablets cannot be prepared, powders will answer the purpose equally well.

The above prescriptions are indicated for the second or catarrhal stage, a condition in which we usually find the patient when brought for treatment. In their use we must guard against the constipating effects of the camphor and the Dover's powder.

I would warn here against the forcible use of the syringe in the treatment of nasal disorders, or any form of nasal irrigation with any of the saline solutions which requires force for its use. Infection is easily carried into the eustachian tubes which may be the starting-point of very grave complications, a suppurative otitis being thus very easily produced.

Mothers should be instructed to use an enema of warm sweet-oil or soapsuds if the bowels do not move once in twenty-four hours. In children of a markedly constipated habit the Dover's powder may be omitted. Internal medication, if begun early and properly carried out, will not be needed for more than two or three days. During an attack of acute rhinitis, the child should not be unnecessarily exposed to cold, as there is a strong tendency for the disease to descend and involve other portions of the respiratory tract.

CHRONIC RHINITIS; NASAL CATARRH

A nasal discharge, more or less constant, is present in not a few children during their entire child life. In the majority this discharge begins with the onset of cold weather and lasts until spring. It may be composed of thin, watery mucus, or it may be mucopurulent in character.

It may be due to several causes, which will be given in the order of their frequency; for, in order to treat this condition successfully the source of the discharge must be discovered:

1. Adenoids in the nasopharyngeal vault.

2. Hypertrophy of the turbinated bones, with septal deviations, and hypertrophy of the mucous membranes.

3. Infection due to pyogenic bacteria. When present it may follow an acute rhinitis, but it is more often the sequel of one of the infectious diseases. The discharge may be distinctly purulent and is often very profuse.

4. Infection due to the Klebs-Loeffler bacillus. I have seen a great many cases in children from early infancy to eight years of age in which there was a serous discharge from one or both nostrils, which had persisted for a considerable period of time, in one for an entire year. Examination of the discharge showed it to contain the Klebs-Loeffler bacillus. These children were not ill, and were brought to us for the discharge alone. Such cases do not clear up under the ordinary methods of treatment, but promptly respond when from 1500 to 2000 units of diphtheria antitoxin are given.

5. With hay-fever there is a periodic discharge which may be said to be chronic in character, extending over several weeks.

6. Malnutrition. A thin, watery discharge apparently due to relaxed mucous membranes is seen in weak and poorly nourished children, with no other symptom to explain the trouble except the general weakness.

7. Foreign bodies. A foreign body in either nostril will produce a persistent discharge. When a child is brought to me with a history of a persistent serous or purulent discharge from one nostril, I invariably examine for a foreign body, and repeatedly I have found this discharge explained by the presence of a pea, a bean, a piece of coal, or a button. A few weeks ago at the out-patient department of the Babies' Hospital, a child three years of age was brought in because of a persistent right-sided nasal discharge which had existed for seven months. Examination showed that there was a foreign body well up in the nostril. This was removed with considerable difficulty and proved to be a piece of cork.

In these cases of chronic rhinitis the possibility of adenoids (see page 448) should never be forgotten; for they cannot be excluded because a child is not a mouth-breather and does not

snore. Given a child with a chronic, so-called "cold in the head," and you will almost invariably find a child with adenoid vegetations in the nasopharyngeal vault. Examination may reveal the nasopharyngeal space blocked by the growth, so that the entrance with the finger is almost impossible, or there may be but a small pulpy mass, or a ridge or soft, friable growth at the upper portion of the vault, not large enough to produce signs of obstruction, but, actively secreting, it proves to be the source of the discharge. Children who have anterior nasal defects, such as hypertrophies of bone or thickening of the membranes, will usually have adenoids as well. In fact, adenoids play no small part in most of the catarrhal affections of the upper respiratory tract in children, and an examination of a child with a nasal discharge or a cough which is difficult to account for, is never complete without an exploration of the nasopharyngeal vault.

Treatment.—The treatment consists in correcting the condition which causes the discharge. If adenoids are present in a sufficient amount to cause trouble, they should be removed (page 449). No other treatment is of any avail. For deformities and hypertrophies of the anterior nasal structure, operative measures are also essential, but should be carried out by one skilled in rhinoplastic work. Purulent rhinitis, primary or following the infectious diseases, is best treated by a spray composed of liquid albolene, one ounce, ichthyol ammonia sulphate, two grains, which should be thoroughly shaken before using. This should be used as a spray every two hours while the child is awake. Once or twice a day it may be well, if the secretion is profuse and purulent, to instil into the nostril about 20 minims of a one-to-six aqueous solution of hydrogen peroxid. If the Klebs-Loeffler bacillus is present, antitoxin alone will control the disease, and that very promptly.

The anemic and malnutrition cases, which show almost no abnormality, but suffer more or less from a constant serous discharge, are benefited by constitutional measures only—a dry climate, plain, nourishing food, iron, cod-liver oil, massage, and salt baths. Their management is referred to in detail under The Management of Delicate Children (page 148). In these children, local treatment other than that of cleanliness is a loss of time and energy. The operation for the removal of adenoids, the treatment of hay-fever, and the methods of removing foreign bodies from the nostrils are all referred to under their respective headings.

RECURRENT CORYZA AND ANGINA

Occasionally we see patients in whom there is a history of frequent so-called "colds" with fever, profuse nasal discharge, and sore throat. Several attacks occur each winter and usually two or three during the summer months. Adenoids probably were

present originally and possibly enlarged tonsils; but after their removal the attacks persisted, though perhaps they were less frequent and less prolonged. Still the tendency to coryza was by no means obviated and the parents are vigorous in their denunciation of the operator and adenoid operations in general.

These cases are of the same type as those of recurrent bronchitis, and the suggestions under that head (page 274) will be the best for us to follow here.

NASAL HEMORRHAGE

Nasal hemorrhage in a child is usually due to one of two sources—adenoid vegetations in the nasopharyngeal vault or an erosion or ulceration of the mucous membrane covering the free vascular area of the anterior portion of the nasal septum.

Treatment.—When the hemorrhage is due to an adenoid growth, it is usually readily controlled by keeping the child in an upright position, or by the application of cold to the back of the neck—preferably by a piece of ice wrapped in a table napkin or by an ice-bag. When the hemorrhage is due to an erosion of the septum, pressure of the finger on the outer side of the bleeding nostril will effectually control it, or the nostril may be packed with cotton saturated with a 5 percent solution of antipyrin or a 1 : 2000 solution of adrenalin.

For permanent relief, and to prevent a recurrence of the hemorrhage, adenoids should be removed and an excoriated or ulcerated septum cauterized with a 50 percent solution of silver nitrate. If the ulcer is first cleaned with plain water, ordinarily but one or two applications of the silver solution will be required. Spraying the affected side with a 1 percent solution of ichthyol in liquid albolene will hasten the healing process. As the ichthyol is not soluble in the oil, the mixture should be well shaken before using.

THROAT EXAMINATION

In order to examine the throat of a young child quickly and thoroughly, it is necessary that he be held in a proper position in front of and at the right side of the attendant, supported by her left arm, beneath the buttocks. Her right arm, which is thus left free, is passed around the child, binding his arms to his sides (Fig. 22). The child's head rests against the shoulder of the attendant. The physician places his left hand on the child's head to steady it, and with the tongue depressor or teaspoon in his right hand, with the child in perfect control, the tongue is pressed downward so that it will not obscure the field of vision. With an older and stronger child, it is best to bind the arms to its sides with a large towel or small sheet. The most satisfactory view can be obtained by daylight before a window. If the examination is made in the evening, a lamp or taper held by a third person, a little above and

behind the attendant's right shoulder, will furnish a satisfactory illumination. The head-mirror should be used for children who are too ill to be taken out of bed, the reflection from a lighted lamp or candle being sufficient.

FAUCITIS

By the term "faucitis" we understand an inflammation of that portion of the mucous membrane of the buccal cavity situated

FIG. 22.—EXAMINATION OF THE THROAT.

posteriorly to the soft palate and the anterior pillars of the fauces, including both the anterior and posterior pillars, the tonsils, and the pharyngeal wall. The inflammatory process is superficial, involving the mucous membrane only, so that the tonsils are involved only to the extent of the mucous membrane.

Faucitis is always present in scarlet fever, usually to a marked

degree. In measles it is also present, but it is less intense in its manifestations. Its most frequent appearance is in connection with a summer cold. Every year in late May and June I am called upon to treat a great many such cases. There is always cough, dry and ineffective, with a slight fever, from 100° to 101° F. The child complains of sore throat and there is some discomfort in swallowing. Upon inspection, an intense inflammation will be noticed involving the entire visible mucous membrane. In many cases the inflammation extends downward and involves the larynx, which will be indicated by the hoarse, croupy character of the cough. The entire illness is ordinarily of three or four days' duration.

Treatment.—The condition is best relieved by a purgative of rhubarb and soda—3 grains of powdered rhubarb and 3 grains of soda for a child from two to five years of age. For a child under two years of age 1 to 3 grains of rhubarb and 1 to 2 grains of bicarbonate of soda may be given. This in a child from one to three years of age is followed by a tablet or powder of tartar emetic $\frac{1}{90}$ grain, powdered ipecac $\frac{1}{60}$ grain, and chlorate of potash 1 grain, at two-hour intervals. Older children, three years and over, receive 2 to 3 grains of chlorate of potash, $\frac{1}{90}$ grain of tartar emetic, and $\frac{1}{40}$ grain of ipecac at two-hour intervals—six doses in twenty-four hours.

PHARYNGITIS

Inflammation limited to the posterior pharyngeal wall is of rather infrequent occurrence in young children. When present, the parts present a reddened, granular appearance. In the cases which have come under my observation, such a condition has always been associated with digestive disturbances. The tongue is usually coated and the breath foul. A dry cough and frequent attempts at clearing the throat are the usual symptoms. The temperature is rarely above 101° F. It is to be distinguished from the pharyngitis which occurs as a result of exposure, in that only the posterior wall is involved, the adjacent structures remaining unchanged. Thus the tonsils and pillars of the fauces and the soft palate present a normal appearance.

The treatment is to reduce the diet for a few days to cereal gruels,—barley, rice, or wheat,—or to chicken or mutton broth. Calomel, $\frac{1}{10}$ grain with one grain of rhubarb after feedings, three times a day for three days, will promptly relieve the condition.

TONSILLITIS

The onset of tonsillitis is usually sudden. There may be a chill, and in a few of my cases an attack has been ushered in by convulsions. However, the usual mode of onset is with fever, 101° to 103° F., lassitude, loss of appetite, and muscular soreness. Young children may show difficulty in swallowing and older children may

complain of pain in the throat. Not every case of tonsillitis, however, is associated with pain in the throat. Inspection reveals the tonsils swollen and reddened, covered perhaps with light colored, cheesy deposits scattered over the surface. In some instances the disease limits itself to swelling and redness; in others the cheesy deposit is an early symptom. The exudative areas may remain distinct and single or they may coalesce, forming a pseudo-membrane. The duration of the disease ordinarily is from three to five days. During the attack the patient feels ill, and often the prostration is considerable. There may be a slight swelling of the lymphatic glands at the angle of the jaw, but this is usually absent. If there is a great deal of tenderness of the glands with a sore throat, it is a suspicious sign, and should make one examine very carefully for diphtheria. Children of rheumatic inheritance and those who have had rheumatism usually suffer from repeated attacks of tonsillitis.

Differential Diagnosis.—Tonsillitis must be differentiated from tonsillar diphtheria, and there are few harder problems to solve; in fact, in many cases, early in the attack, the solution is impossible without a bacterial examination. The following characteristics of the average case of the two diseases may aid us in differentiating.

Tonsillitis.—Onset sudden; fever high at onset, 102° to 105° F. Glands at the angle of the jaw slightly swollen, if at all. Exudation, follicular, appears as small dots; membrane may form through coalescence.

Tonsillar Diphtheria.—Onset gradual; fever usually low at onset, 100° to 102° F. Lymphatic glands at the angle of the jaw considerably swollen; membrane present on the tonsil, appears in thin grayish layers which gradually become thicker and more extensive.

Mixed Infection.—A case of mixed infection may present at first a picture of a typical tonsillitis. The temperature may vary from 103° to 105° F. There is pain upon swallowing, prostration, and loss of appetite with a follicular exudation. The case remains stationary for from twenty-four to forty-eight hours, when the dots coalesce, forming a firm membranous deposit, the lymph-nodes at the angle of the jaw enlarge, and, in short, both the clinical manifestations and the bacterial examination show that we have to deal with a case of diphtheria.

The cases of diphtheria which are preceded by a clinical tonsillitis are probably the most dangerous. Such a case was primarily a tonsillitis and diagnosed as such, and for several days considered to be only a tonsillitis, in spite of the membranous deposit which formed later. This gives abundant opportunity for the exposure of other children, and the delay in making the diagnosis postpones the use of antitoxin, rendering the remedy of little or no avail when

finally given. It is my rule to consider as diphtheria every case in which there is a pseudo-membrane on the tonsils, and to treat it with antitoxin without waiting for a bacterial examination. Furthermore, when there are other children in the family, I invariably quarantine every case of simple tonsillitis.

Treatment.—Local treatment of the diseased parts in tonsillitis by spraying, swabbing, and painting has been of very little service in my hands, particularly in children under four years of age. When the child is held by force for such treatment, thoroughness is impossible and little or nothing is accomplished. For tractable children and those old enough to understand what is being done, gargles, sprays, and irrigations are useful in so far as they relieve pain and cleanse the diseased parts. A useful gargle is the following:

℞. Sodii salicylatis
Sodii biboratis
Sodii bicarbonatis .....āā gr. xlv
Essentiæ menthæ piperitæ.....℥j
Aquæ.....q. s. ad ℥ij
Sig.—One teaspoonful in one-half glass of water at 115° F. Gargle entire quantity every hour.

A useful spray is the following:

℞. Acidi borici.....gr. lx
Aquæ menthæ piperitæ.....℥viij
M. Sig.—Spray throat every two hours.

Irrigation of the throat is indicated in tonsillitis not only on account of cleanliness, but because of the relief from pain which it affords. In severe tonsillitis, with much swelling and the consequent tension, the pain upon swallowing is often excruciating. For the irrigation there are needed a fountain syringe and a clean tube for introduction into the mouth. The child may lie down or sit up, as preferred. If in the recumbent position, the head should be turned to one side, the mouth resting over a pus basin, which catches the water as it passes out during the irrigation. If it is preferred to give the irrigation with the patient sitting erect, a basin held under the chin will catch the water as it flows from the mouth. Two pints of a normal salt solution—one teaspoonful of salt to a pint of water—at 115° F. is placed in the bag, which has previously been warmed. The bag is held two feet above the child's head and the solution is allowed to flow in a brisk stream against the swollen parts, until at least one pint of the solution has been used. The irrigations if they furnish much relief may be repeated in from four to six hours.

It is advisable to begin the treatment with a laxative. One grain of calomel in divided doses, one-sixth grain every hour, answers well. The child's food is reduced. If bottle-fed, the milk is given one-half strength, one-half quantity of the milk mixture being

given with an equal quantity of water. The fever, if high, is readily controlled by cool sponging (page 502).

The only drug which has appeared to me to possess any signal value for internal use in tonsillitis is chlorate of potash. One grain at two-hour intervals for a child one year of age; 2 grains at two-hour intervals for a child two years of age—16 grains in twenty-four hours; 3 grains for a child three years of age—24 grains in twenty-four hours. I rarely give more than 3 grains at two-hour intervals at any age. I have used chlorate of potash in this way for several years, and I have never been able to associate the drug with kidney complications in one of the hundreds of cases in which I have used it. It is usually made in solution with simple elixir and water, or syrup of raspberry and water.

Fig. 23.—Cold Compress in Position.

Cold compresses (see Fig. 23) to the throat are of aid in older children—those who can appreciate the necessity of the treatment. In the young, those under two years of age, it is difficult to keep the applications in position. My instructions are to fold and soak a table napkin in cold (40° to 50° F.) water. The compress should be about 2½ inches wide and from four to five thicknesses of the material should be used. The water is pressed out and the dressing is placed under the jaw, so that the ends reach to the ears. The compress is covered with oiled silk or rubber tissue and is held in position by a

handkerchief or a piece of cheese-cloth, which passes over and around it, and may be tied at the top of the head. It should be removed every thirty minutes, wrung out of cold water, and reapplied. When the compress is put on, as we often see it, wrapped around the neck, it will be of no service, as it does not even touch the parts affected. Children who have repeated attacks of tonsillitis are put on antirheumatic treatment (page 486) in the intervals between attacks.

HYPERTROPHIED TONSILS

Chronic enlargement of the tonsils is usually the result of several acute attacks of tonsillitis. A tonsil is said to be enlarged when it extends beyond the pillars of the fauces. Enlarged tonsils produce mouth-breathing, disturbances of speech, and eustachian-tube catarrh, and they are doubtless a factor in adenoid etiology. Children with enlarged tonsils are also particularly susceptible to diphtheria. In the crypts are harbored myriads of bacteria, which, under favorable conditions, produce repeated attacks of acute inflammation: the pneumococcus, the tubercle bacillus, the Klebs-Loeffler bacillus, and many other pathogenic bacteria have repeatedly been found in the tonsillar crypts. Children of rheumatic inheritance are very apt to have enlarged tonsils.

Treatment.—The treatment consists in removal—excision (see page 448). Sprays, gargles, and local applications are of little or no avail. When, for any reason, the operation is not possible, cauterizing with a galvanic cautery is indicated. Several sittings at intervals of five or six days will be required, however, to reduce a tonsil of any considerable size. Occasionally cases are seen in which the tonsils are broad and flat, with marked increase of connective tissue and dilated crypts; in such cases when the tonsil is not large enough to be removed with a tonsillotome the tonsil punch or the cautery may be brought into use. A few sittings will practically remove the tonsil, and its possibilities as a culture-field for pathogenic bacteria are destroyed. The application of a 5 percent solution of cocain on a swab will render the cauterization comparatively painless.

Hypertrophied tonsils should be removed for two reasons: (1) their obstruction to respiration, and (2) their capacity for harboring all sorts of bacteria, among which the tubercle bacillus and the Klebs-Loeffler bacillus are the most important.

PERITONSILLAR ABSCESS; QUINSY

The seat of a peritonsillar abscess is in the cellular tissue about the tonsil. It may be above, in front of, or behind the tonsil. The disease is seen rather infrequently in children. I have seen but

one case in a child under six years of age. It usually follows a tonsillitis. In none of my cases has it followed diphtheria, scarlet fever, or measles. The history is usually as follows:

The child has a tonsillitis with the usual symptoms, with the addition of greatly increased swelling and pain upon swallowing. He complains of pain in the muscles of the neck on the affected side, the head being held toward that side. A fairly early symptom is inability to open the mouth to the usual extent. In the average case, inspection reveals a reddened, edematous swelling slightly above and in front of the tonsil, causing a forward displacement of the uvula. In a few instances I have seen it develop behind the tonsil, in which case the tonsil on the affected side will appear unduly prominent. This type of case is very apt to be overlooked unless a digital examination is carefully made, when a soft, fluctuating swelling will readily be felt behind the tonsil.

Treatment.—The treatment is by incision. This, however, should not be made until the abscess is fully developed. If the incision is made too early, it has in my cases invariably closed and required reopening. This closure sometimes occurs even after a timely operation, because too small an incision is made and the contraction of the abscess wall necessarily following the free discharge of pus and blood effectually closes the opening.

For operation the patient should be wrapped in a large towel or sheet to bind the arms securely to the sides. He should sit in an upright position on the lap of the attendant, against whose right shoulder his head rests. The left arm of the attendant is passed around the patient, holding him firmly, while the right hand grasps his forehead. A Denhard gag of the O'Dwyer set should be used to hold the mouth open. Either by the use of reflected light from a head-mirror, or with the patient facing a window, the operator, using a guarded bistoury, makes a free incision in the abscess from above downward. The escape of a considerable amount of blood usually follows the withdrawal of the knife. Oftentimes more blood than pus is discharged. This is particularly apt to be the case if the abscess is opened early.

It is interesting to note that the cases which open spontaneously never heal spontaneously. In addition to a free incision it is my custom, during my daily visits immediately after the operation, to prevent a closure of the wound by passing into it a director, and, by moving it up and down, break up any beginning granulations. With free, uninterrupted drainage the case is usually well in from three to five days.

Aside from a saline laxative, which should be given early in the attack, internal medication is valueless. Two drams of Rochelle salts or six ounces of a solution of citrate of magnesia are usually

ordered. Other means of treatment are directed to the comfort of the patient. An ice-bag applied externally before operation may be grateful to the patient. Our greatest means of furnishing relief, however, lies in the use of the hot saline irrigation, and the hot gargle where practicable. But few children can gargle well enough to make this advantageous, so that ordinarily it is best dispensed with. With the few cases where it is practicable, I have found the following prescription and method of use of service:

℞. Sodii bicarbonatis.....gr. xlv
Essentiæ menthæ piperitæ.....℥j
Aquæ.....q. s. ad ℥ij
Sig.—Add 1 teaspoonful to 6 ounces of water at 120° F. and gargle entire quantity every half hour.

The pain occasioned by gargling is another objection to its use in children. A far more effectual means of relieving pain in this disease, and one which causes no effort nor distress whatever, and which gives astonishing relief, is a saline irrigation which is prepared and given as follows: A heaping teaspoonful of salt is added to one pint of water at 120° F. This is placed in a fountain syringe which is previously warmed. A towel is placed around the patient's neck, to protect the clothing. The basin is held under the mouth, to catch the drainage. With everything in readiness, the bag containing this solution being hung from two to three feet higher than the child's head, the end of the rubber tube, a part of every fountain syringe, without the hard-rubber tip attachment, is placed in the child's mouth and the hot solution is allowed to flow against the inflamed surfaces until the entire pint has been used, pressure being maintained upon the tube so that the flow will not be too free. For the first irrigation or two, there will be more or less coughing, and the child may have to rest after an interval of a few minutes. After he becomes accustomed to the procedure the entire pint may be used without intermission. The irrigations may be repeated every hour and may be used as well after as before operation. When once the child experiences the relief afforded, there will be no trouble in repeating the irrigation.

RETROPHARYNGEAL ABSCESS; SUPPURATIVE RETROPHARYNGEAL ADENITIS

A retropharyngeal abscess is usually a streptococcus infection of one or more of the retropharyngeal lymph-nodes which form a chain on either side of the median line, posterior to the pharynx and between the pharyngeal and the prevertebral muscles. The nodes are said to disappear at about the third year of life. It has never been my privilege to see a case in a child over three years of age. The disease is very liable to be overlooked. Seven of

my cases had been treated—and all but one of them treated by more than one physician—for something other than retropharyngeal abscess. This failure to recognize the affection has been commented upon by others, recently by Morse, of Boston. It is due to two causes: First, pediatric writers in their description of the disease have laid down too narrow and definite a symptomatology; second, the lack of thoroughness on the part of physicians in the examination of their cases results in their failure to discover the true nature of the case.

In describing the disease, writers tell us that the patient holds his head in a characteristic position, backward and toward the affected side; that the breathing is noisy and stertorous in character; that there is difficulty in swallowing; that there are enlarged lymph-glands at the angle of the jaw, and that, on examination, a bulging of one side of the posterior pharyngeal wall is usually discovered. Only four of my cases showed the above combination of symptoms. All the cases showed but two symptoms in common—difficulty in swallowing and changed voice. Other than this the cases varied widely, depending upon the location of the abscess. Obviously, an abscess situated low down on the posterior pharyngeal wall will not manifest itself in the same way as one high up behind the soft palate.

Illustrative Cases.—A baby nine months of age had been under treatment in one of the outdoor clinics of New York city. A diagnosis of adenoids had been made and a day appointed for the operation. The mother, wishing to have the diagnosis of adenoids confirmed, brought the child to the out-patient department of the Babies' Hospital. The symptoms of mouth-breathing, nasal voice, and slight difficulty in swallowing had been present for a couple of weeks. There was no characteristic position of the head, no rigidity of the neck, no superficial enlargement of the lymphatic glands. Inspection of the throat disclosed a bulging forward of the soft palate on the right side. A digital examination revealed a round, fluctuating mass, the size of a hickory-nut. It was found high on the posterior pharyngeal wall and almost entirely covered by the soft palate. No adenoids were present.

A baby two years of age had been ill for a week with tonsillar diphtheria and was thought to be recovering, when suddenly the voice became hoarse and croupy, with gradually increasing dyspnea. There was both expiratory and inspiratory obstruction, such as we expect in laryngeal diphtheria, and the attending physician, an excellent practitioner, naturally concluded that the diphtheritic process had extended to the larynx. There was stiffness of the neck but no nasal obstruction (see above). There was slight difficulty in swallowing. Inspection of the throat with a dim light revealed nothing

but the enlarged tonsils. I was called to intubate, and finding the respiratory obstruction sufficient to require intubation, I proceeded to make a digital examination, as is my custom before intubating. I was not a little surprised to find a soft, fluctuating mass low down in the pharyngeal wall, extending below and pressing against the glottis. The abscess was opened, with immediate relief to the obstruction.

A baby, seven and a half months of age, was an inmate of the country branch of the New York Infant Asylum during my service in that institution.[1] My attention was first called to the child because of its difficulty in swallowing. There was very little obstruction, but the voice was harsh, hoarse, and croupy. About a month previous, there had been a suppurating submaxillary adenitis. On examining the throat, a large abscess was seen on the right pharyngeal wall, extending downward as far as could be seen. This case was my first experience with retropharyngeal abscess, and a Denhard gag of the O'Dwyer set, which should never be used in these cases, was introduced and the child held in an upright position by the assistant. While feeling for the thinnest point of the sac for a suitable place for the incision the child suddenly stopped breathing, became limp and apparently lifeless. An intubation tube, the smallest of the O'Dwyer set, was quickly introduced without the gag. After several minutes of artificial respiration, the use of oxygen, and free hypodermic stimulation with brandy, respiration was again established. The first inspiration was so long delayed that we had almost given up the case as hopeless, when the first short gasp occurred. In half an hour the child had sufficiently recovered to allow the opening of the abscess. This was done without a gag, with the tube in position. After a copious discharge of pus, the tube was removed and the child recovered. In this case, the suffocation was due, doubtless, to the introduction of the gag and the pressure of the finger, which forced the pus into the lower portion of the sac, which extended below the glottis, where it exerted sufficient pressure to prevent the entrance of air.

A private patient one year old had diphtheria—laryngeal, faucial, and tonsillar. Under 9000 units of antitoxin and intubation, satisfactory progress was made, and on the eighth day of the illness the tube was removed. It had to be replaced in a few minutes because of returning dyspnea. Upon replacing the tube an abscess was found in the right posterior pharyngeal wall, pressing upon and extending below the larynx. The presence of the tube had prevented the recognition of the abscess, as the voice and breathing were per-

[1] The case was reported at the time by Dr. Henry E. Tuley, assistant resident physician.

fectly normal. It being decided that this was the cause of the obstruction, the abscess was evacuated, but the marked edema of the glottis still caused considerable respiratory obstruction, and the tube was required for two weeks longer. The child made a perfect recovery and is well and strong today.

The above cases are cited in detail in order that the reader may the more fully realize that retropharyngeal abscess may exist without the so-called "characteristic symptoms," and also to emphasize the fact that many cases have been, and will continue to be, overlooked until physicians use the finger as an aid to diagnosis in the diseases of the upper respiratory tract. It is to be remembered that there is no "characteristic breathing" and no "characteristic position" of the head in retropharyngeal abscess. The disease is usually secondary to retropharyngeal adenitis, due to infection from adjacent diseased structures. There is always fever, 101° to 104° F., with loss of appetite. Occasionally the abscess points outward and requires external incision.

Treatment.—The diagnosis made, there is but one means of treatment—incision and evacuation of the pus. In order to do this it is necessary that the child be under perfect control. The arms should be bound to its sides with a large towel or a small sheet securely pinned. The child is held in an upright position on the lap of the attendant, who passes his left arm around the child, while his right hand grasps the forehead, drawing the head for further support backward against the right shoulder. The operation should be performed in a good light—either reflected light from a head-mirror or direct light from a window. With a tongue depressor in the operator's left hand the mouth is kept open, and with the tongue out of the way, the right hand is free to make the incision, for which an ordinary scalpel is used. The incision should be from above downward and at least one-half inch in length. A basin should be in readiness and the attendant instructed to invert the child at a word from the operator as soon as the incision is made. This allows the pus and blood, which, if aspirated into the trachea, may produce fatal results, to stream out of the mouth. While the abscess is discharging and the head dependent, the clean index-finger of the operator should explore the cavity, enlarge the opening, if necessary, and remove any necrotic tissue that may be present. The case should be carefully watched for several days, as the opening is liable to close before resolution is complete, particularly if it has not been enlarged with the finger. Recovery is usually complete in from five to seven days.

RETROPHARYNGEAL ABSCESS (TUBERCULOUS); CARIES OF THE CERVICAL VERTEBRÆ

The condition is usually described as associated with idiopathic retropharyngeal abscess, though it should not be, as the condition is a part of and results from tuberculous disease of the spine, which will be referred to under the proper headings.

IRRIGATION OF THE THROAT

Indications.—In peritonsillar abscess or retropharyngeal abscess after operation, in sloughing ulcerative processes in the throat, such as we see in diphtheria rarely, but with comparative frequency in scarlet fever, irrigation of the throat with hot normal salt solution is of distinct therapeutic value. The relief to the pain, particularly in quinsy, before operation, is sufficient to warrant its use. Those who have treated thus the fetid sloughing throat of scarlet fever, for example, need no argument as to its possible advantages. Acute suppurative otitis is always due to the throat infection. Gargling in children is a measure of very limited usefulness even in those who do it well, for the reason that the solution employed scarcely comes in contact with the post-pharyngeal wall and the lateral faucial structures. In a great majority of older children, and in all young children, it is practically useless so far as the cleansing of the deeper faucial structures is concerned.

Cervical adenitis, acute, persistent, and suppurative, is the direct result of throat infection. An important means of preventing it, with its distressing consequences, is an effective throat toilet. Often in scarlet fever not a small part of the systemic infection after the third or fourth day is through the throat. The irrigation should be done two or three times a day as follows:

Operation.—The child is wrapped in a sheet, which is securely pinned, binding his arms to his sides. He rests on his right side without a pillow. Directly under his mouth is a pus basin to catch the outflow. A new fountain syringe, containing a hot salt solution, 120° F., is suspended about three feet above the child's body. The largest size of the hard-rubber rectal tip is fastened to the pipe and the tip placed between the child's teeth. The current, interrupted every few seconds, should be forcible enough to increase its efficacy as a cleansing agent, the volume of fluid being so small that no inspiration of the water occurs.

The first irrigations will arouse more or less rebellion on the part of the patient and but one-half pint of the solution need be used. In older children no trouble will be experienced after the relief afforded by the first injection is appreciated. In refractory young children, from two to four years of age, the assurance that there will be no pain and a promised reward will reduce the

struggling to a minimum. It is not to be expected that the child will not cough; in fact, a moderate amount of coughing is desirable, as it dislodges the pus and sloughing tissue, enabling the solution to cleanse the parts more effectually.

ACUTE CATARRHAL LARYNGITIS; SPASMODIC CROUP

By acute catarrhal laryngitis we understand an idiopathic catarrhal inflammation, involving the larynx and the adjacent structures. Nervous, rachitic children are particularly susceptible to the disease. Adenoids are often a predisposing cause. The onset may be sudden or gradual. Cases which are of a gradual onset usually follow an acute inflammatory condition of the nasopharynx. At first there is usually a catarrhal rhinitis, the fauces and larynx becoming successively involved, requiring two or three days, perhaps, before the laryngitis is well marked. The temperature is usually not high at the onset. One of the early symptoms indicating laryngeal involvement is a hard, dry cough, croupy and "barking" in character. The croupy element in the cough increases in severity toward evening.

In the cases with sudden onset, the child retires at the usual hour in apparently good health; a few hours later he wakes with a characteristic cough. Whether the case is of sudden or gradual onset, the care is practically the same after the cough develops. Many cases stop at this point. There is a severe cough for a few days which subsides under proper treatment. For a few of the cases, however, the course is not so favorable; the cough continues, becoming stridulous, every inspiration being accompanied by a loud crowing sound. Occasionally a case will be seen with marked laryngeal obstruction, due to the swelling and laryngeal spasm, that will require intubation. In my experience, however, this is very rare, as I have had to intubate but one child with catarrhal, non-membranous croup—an infant sixteen weeks old.

Acute laryngitis may be confused with diphtheritic or membranous laryngitis. For differentiation, see page 308.

Laryngismus stridulus may be mistaken for catarrhal laryngitis. It is easy to differentiate, when one remembers that there is no cough in uncomplicated laryngismus stridulus, and that the laryngeal spasm is usually associated with excitement, fright, or some other nervous influence. Further, laryngismus stridulus does not occur as a definite illness, the laryngeal spasm, mild or severe, occurring, as a rule, several times a day, covering a period of weeks or months. The continued obstruction, always associated with inflammatory conditions of acute catarrhal laryngitis, is absent.

Treatment.—In the treatment of catarrhal laryngitis in children, two factors must be kept in mind: First, the congestive infiltration

and dryness of the parts, which cause the metallic cough and the stridulous breathing; second, the laryngeal spasm, which is purely a nervous manifestation, due, doubtless, to the irritation of the terminal filaments of the recurrent laryngeal nerves which supply the larynx.

FIG. 24.—CRIB PREPARED FOR STEAM INHALATION.

Not in every case of laryngitis in children by any means do we have croup. But when croup is present, we know that back of it there is laryngeal spasm with congestion and inflammation. If we are to treat these cases of catarrhal croup successfully, with quick recoveries, we must not lose sight of the nervous element, which is considerable.

Expectorants.—For the simple coughs, without interference with

respiration, the expectorant and steam treatment answer admirably, regardless of the age of the child. This special treatment should be preceded by a full dose—from one to three teaspoonfuls—of castor oil. For a child under one year of age a tablet composed of tartar emetic $\frac{1}{100}$ grain with powdered ipecac $\frac{1}{60}$ grain should be given every two hours—eight doses in the twenty-four hours. If the tablets or powders are not to be had, two drops of syrup of ipecac may be given instead. For a child from one to two years of age a tablet

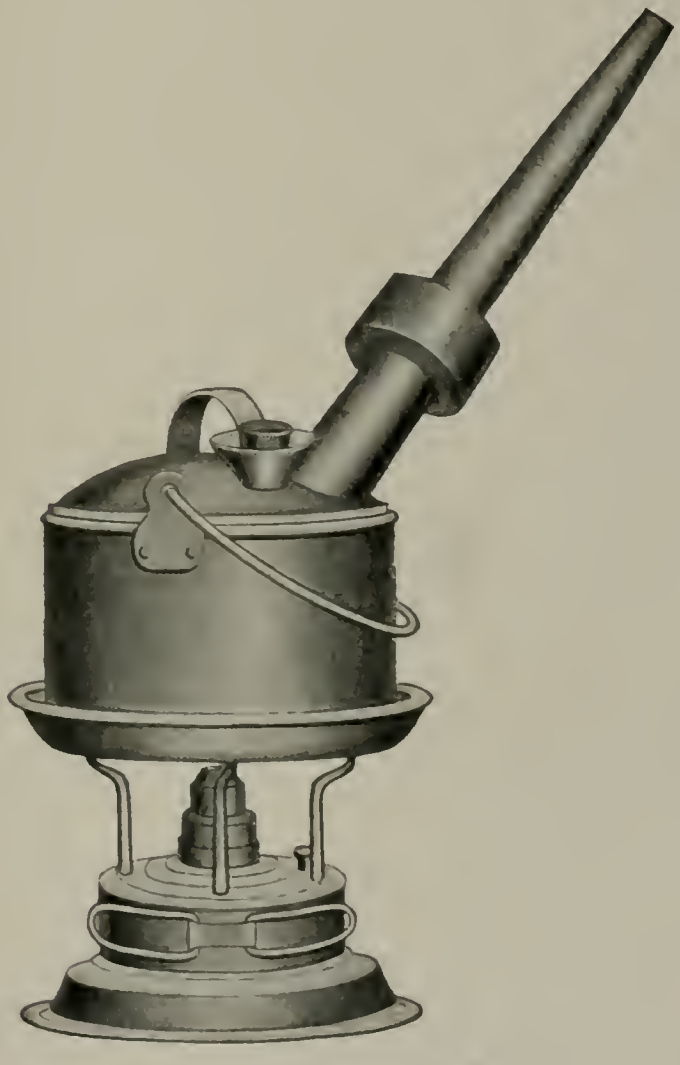


Fig. 25.—The Holt Croup Kettle.

or powder composed of $\frac{1}{100}$ grain of tartar emetic, $\frac{1}{40}$ grain of powdered ipecac, $\frac{1}{4}$ grain of Dover's powder at two-hour intervals, eight doses in twenty-four hours. After the first day the treatment should be commenced early in the morning, so that by evening, when the cough and spasm are at their maximum, the full influence of the drugs may be felt. From the third to the sixth year, a powder

or tablet composed of tartar emetic $\frac{1}{90}$ grain, powdered ipecac $\frac{1}{30}$ grain, and Dover's powder $\frac{1}{2}$ grain should be given at two-hour intervals, eight doses in twenty-four hours. At least eight doses of one of the above prescriptions should be given daily, in order to get the full benefit of the drugs employed. If the Dover's powder produces constipation it may be omitted, or a laxative may be given; usually the treatment need not be continued more than two or three days. In case the attack is mild, it is best to omit the Dover's powder.

Cold Compresses.—In older children a cold compress to the throat is a valuable local measure. A napkin or piece of old linen answers best for this purpose. It is so folded that there are at least six thicknesses of the material. This is moistened with cold water at 60° F., wrung thoroughly, and placed against the neck, under the jaw, so as to extend from ear to ear. Over this should be placed a piece of oiled silk or rubber tissue, and all held in position by a strip of thin muslin or cheese-cloth, which should be brought together at the ends and fastened at the top of the head. The compress should be changed every thirty minutes. In very young children this treatment is rarely satisfactory, for the reason that it is difficult to force the child to allow the bandage to remain in place. The practice of placing the compress around the neck, as is often done, is of no value, as it does not even touch the diseased parts. (See Fig. 23.)

Steam Inhalations.—Steam inhalations are effective only when the patient is kept in an enclosed space. The steaming kettle in the room is of little or no service. The easiest and most practical place for the child is in its crib, which should be covered with a sheet. An open umbrella may be substituted when a crib is not available. Under the umbrella, which rests upon the bed, lies the child, and covering all is a sheet which is pinned to the umbrella; or the umbrella may be opened and placed over the baby-carriage and draped as before. Any means or apparatus which will furnish steam and conduct it to the enclosed space containing the child will answer. The Holt croup kettle (Fig. 25) is always to be used when obtainable. The steaming may be continued for hours, if required. The sheet should be removed occasionally for a few moments, in order to allow a change of air. Usually a child is kept under the tent from twenty minutes to one-half hour without such a change. The tent is seldom so close as to prevent all ventilation.

Calomel Fumigations.—A quicker and more effectual means than steam is the use of calomel fumigations. The patient is placed under a tent prepared as above. The Ermold lamp, made especially for this purpose (Fig. 26), is recommended, but the ordinary alcohol lamp used for warming milk answers every purpose. Ten grains of calomel are placed in any tin receptacle, which rests or is held over the flame.

An ordinary kerosene lamp has served me well in a few instances, the calomel being placed in the cover of a tin can which was held by a pair of pincers over the top of the lamp chimney. Regardless of the method, the fumigation must be constantly watched by some competent person, so as to avoid the possibility of igniting the bedclothes. When the fumes begin to fill the tent, the child will cough considerably. If the cough continues for more than a few minutes, it is advisable to allow a portion of the vapor to escape. The calomel will be consumed in from five to ten minutes, depending upon the degree of heat used. After the tent is filled with the vapor, allow the child to inhale it for about one-half hour. The vapor produces a free secretion from the mucous membrane of the parts and a local depletion, with enlargement of the lumen of the larynx and consequent relief of the symptoms. The fumigation may be repeated after an interval of two or three hours. In a non-diphtheritic case I have rarely had to repeat the inhalations more than two or three times.

FIG. 26.—ERMOLD'S LAMP.

Anti-spasmodics.—In the cases of sudden onset, in which the spasmodic element is prominent at the commencement of the attack as indicated by the high-pitched crowing inspiration, and in some extreme cases by the struggle for breath, the cyanosis, the stridor, and the infrasternal recession, the above treatment will not answer. In such cases we must combine an expectorant with anti-spasmodic drugs. A full dose of syrup of ipecac—one to two teaspoonfuls, or sufficient to produce emesis—should be given at once. If vomiting does not take place in twenty minutes, the ipecac should be repeated. After emesis has taken place, the antispasmodic remedies should be brought into use. Antipyrin and sodium bromid are especially effective at this stage. Antipyrin appears to have a direct sedative action on the nervous mechanism of the larynx. To a child two years of age the following prescription is often given:

℞. Antipyrini.....gr. j
Sodii bromidi.....gr. ij
Syrupi ipecacuanhæ.....♏ij to iij
Aquæ.....q. s. ad ℥j
M. Sig.—Give one such dose every two hours—eight doses in twenty-four hours.

To a child from three to six years of age may be given:

℞. Antipyrini.....gr. ij
Sodii bromidi.....gr. iv
Syrupi ipecacuanhæ.....gtt. iij
Syrupi rhei.....gtt. xv
Aquæ..... q. s. ad ℥j
M. Sig.—Give one such dose every two hours—eight doses in twenty-four hours.

The medication and other treatment are to be discontinued as soon as the dyspnea ceases.

LARYNGISMUS STRIDULUS

Laryngismus stridulus is a spasm of the larynx occurring most frequently in infants. It is rarely seen after the first year. The spasm may cause a partial or complete closure of the glottis.

The severity of the symptoms depends entirely upon the degree of the spasm. In the mild cases, sudden inspiratory effort, as in coughing or crying or from fright, will be sufficient to bring on an attack. The child gives vent to a long-drawn inspiratory crow similar to a whoop in pertussis. This may be followed by apnea which lasts for a few seconds, during which time the child becomes blue in the face. This is soon succeeded by a series of short gasps, and normal respiration rapidly returns. In the more severe and rarer cases, the spasm occurs without warning. This is particularly apt to be the case in the very young—those under six months of age. There is a short, quick inspiration and respiration ceases. The child becomes blue in the face, struggles for breath, and becomes unconscious. In a few seconds there is a relaxation of the spasm, accompanied by a loud, inspiratory crow, followed by two or three others of gradually diminishing intensity until normal respiration is re-established.

Predisposing Causes.—Laryngismus, according to my observation, invariably occurs in weakly children—those suffering from malnutrition and rachitis. Among a large number of cases, the majority of which were seen in dispensary work, I have never known one in which there was not some manifestation of rachitis. The presence of adenoids, or any source of irritation of the upper respiratory tract, increases the severity of the spasm and the number of the attacks. Under properly directed treatment the spasms usually become less and less severe, and finally disappear, although several weeks of treatment may be necessary.

Illustrative Case.—A few years ago, a child five months of age came under my care on account of difficult breathing, rachitis, and laryngismus. The attacks were rather infrequent—once every three or four days—but they were very severe, and in one of them the child died. There was no evidence of enlarged thymus gland in this case.

In another child, three months of age, the attacks ranged from twenty to thirty a day, and were controlled only by a gradual improvement in the child's general condition.

Laryngismus may be mistaken for whooping-cough or catarrhal croup, or it may be associated with both of these affections. When children with pertussis lose consciousness during a coughing paroxysm, the possibility of laryngismus must be kept in mind. There is always a mild laryngeal spasm associated with severe catarrhal laryngitis and whooping-cough, and the value of sedatives in these disorders is explained by their action in preventing laryngeal spasm.

Treatment.—*Drugs.*—The management is divided into two parts: the immediate relief of the spasm, and the treatment of the patient's debilitated physical condition. From my observation, the most satisfactory method of relieving spasm in the mild cases—those in which the unconsciousness is of but a few seconds' duration—is by inverting the patient and at the same time slapping him on the back. Splashing cold water in the child's face may be of advantage in some cases, but I have found it of but little service. In cases which are sufficiently prolonged to resist inversion and slapping on the back, a hasty removal of the outer clothing, with alternate hot and cold tub-baths, at 60° F. and 120° F. respectively, have been successful, except in the fatal case referred to, whose death occurred during my absence. If recovery is not prompt, intubation or tracheotomy should be performed, followed by attempts at artificial respiration. Between the attacks, the patient should receive small doses of antipyrin and sodium bromid. Under six months of age, one-half grain of antipyrin and two grains of sodium bromid may be administered in one dram of cinnamon-water—six doses being given in twenty-four hours. From the age of twelve months to the third year, one to two grains of antipyrin with two to four grains of sodium bromid may be administered in one dram of cinnamon-water—six doses being given in twenty-four hours. The only disadvantage in the use of these drugs lies in the fact that these children almost invariably have faulty digestion, which condition may be aggravated by the sodium bromid. When this is observed, the bromid is best omitted and the antipyrin given alone. Antipyrin apparently never produces any unfavorable effects upon gastric digestion.

Colon medication may be of considerable service in these cases, and when indicated, bromid and chloral are our most reliable sedatives. For a child of six months or under, one grain of chloral with three grains of sodium bromid may be given in two ounces of mucilage of acacia by the bowel; for a child of six to twelve months, two grains of chloral and five grains of sodium bromid in three ounces of mucilage of acacia; for a child of twelve to twenty-four months, two grains of chloral and eight grains of sodium bromid

may be given in two ounces of mucilage of acacia. The bromid and chloral should not be administered oftener than once in six hours.

The method of administration is as follows: A large soft-rubber catheter or a small rectal tube should be attached to a Davidson syringe and introduced at least nine inches into the rectum so as to reach the descending colon. The child should rest on its left side with the buttocks elevated on a pillow so that they are higher than the shoulders. After the withdrawal of the tube the position of the child should be maintained for several minutes in order to aid in the retention of the fluid.

Diet.—The dietetic management of debilitated, rachitic children suffering from laryngismus is the same as that of other debilitated children. (See Malnutrition, page 162.) In general, they should be given as high a proteid diet as is compatible with their digestive powers. Thus, if there is intolerance of cow's milk given in suitable dilution, there should be no hesitation in advising a wet-nurse. Condensed milk or proprietary foods should not be given such a child, if better means of nourishment are obtainable. For children over one year of age, cow's milk, cereals containing a large amount of nitrogen, soft-boiled eggs, beef-juice, and scraped beef should form a large part of the diet. Particularly must these children be kept free from all sources of excitement, such as loud talking, the over-attention of adults, and the rough, active play of older children.

TRAUMATIC LARYNGITIS

Traumatic laryngitis, while a very rare condition in children, is occasionally met with. It may be caused by the inhalation of steam or irritating gases or the aspiration of carbolic or other strong acids.

I once saw a fatal case due to the aspiration of pure carbolic acid by a child three years of age who was given a teaspoonful of the acid by a five-year-old sister. As soon as it passed her lips the child cried and coughed. None of the acid was swallowed, apparently, but sufficient was aspirated into the larynx to produce intense congestion and sufficient edema to require immediate operative measures. The parts sloughed extensively and the child died in two weeks from pneumonia, resulting from sepsis.

Treatment.—No case of corrosive injury to the mucous membrane, sufficient to produce congestion and edema with a resulting inspiratory obstruction which requires operative relief, should ever be intubated except as a temporary expedient, since the presence of a tube will invariably cause extensive sloughing. If the case is urgent, tracheotomy is the only warrantable operation. In two cases due to irritating gases—sulphur dioxid in one case and steam inhalation in

another—the successful treatment was the use of cold applications to the neck by means of wet compresses at a temperature of 60° F.

LARYNGEAL OBSTRUCTION

Laryngeal obstruction may be either complete or partial, causing entire cessation of, or greatly impeded, respiration. As the calls upon the physician for aid in these cases are attended with great urgency, it is well to bear in mind the conditions which may give rise to, or directly cause, laryngeal obstruction. These are referred to in detail under their respective headings. In order of frequency they occur as follows:

1. Acute Catarrhal Laryngitis (Catarrhal Croup), page 259.
2. Membranous Laryngitis (Laryngeal Diphtheria), page 318.
3. Retropharyngeal Abscess, page 254.
4. Foreign Bodies in the Larynx, page 267.
5. Traumatic Laryngitis, page 266.
6. New Growths.
7. Laryngismus Stridulus, page 264.

Acute catarrhal laryngitis, membranous laryngitis, and retropharyngeal abscess are by far the most frequent causes of laryngeal obstruction in children. In children, edema is a very infrequent cause of laryngeal obstruction; it is a complication or a sequel of other pathologic states; for example, it may result from an inflammation accompanying a low-placed retropharyngeal abscess, a traumatic laryngitis after the inhalation of irritating gases, or from the aspiration of corrosive fluids or powders.

FOREIGN BODIES IN THE LARYNX

Foreign bodies are usually lodged in the larynx by an act of sudden inspiration attended by a quick forward movement of the head, as in coughing or laughing with a foreign body in the mouth or between the teeth. The patient is immediately seized with a violent paroxysm of coughing and suffocation, the severity of which depends upon the size and shape of the foreign body.

Inversion of the patient was of no service whatever in the cases seen by me. The first thing to do is to introduce into the mouth the index-finger, with the hope that a portion of the mass may protrude sufficiently to make possible its removal. Should this fail, a laryngeal forceps should be brought into use, its introduction being guided and guarded by the index-finger. When this is not successful, tracheotomy should be performed to relieve the child from immediate danger of suffocation, after which further surgical procedures may be considered. Intubation, it is hardly necessary to state, should not be attempted.

PERSISTENT COUGH

I have had occasion to examine and treat many children who were brought to me because of a "cough" which had not been controlled by the measures employed. The history is usually only that of a persistent cough. It may be irritating in character, keeping the child awake at night, or it may be paroxysmal, the attacks being more severe when the child is lying down. Many times the paroxysms are so severe, being particularly worse at night, that whooping-cough is suspected because of the absence of chest signs.

While we hear much of the cough of teething, the "stomach cough," the "nervous cough," and the "habit cough," it has never been my lot to see a case in which the cough was not connected in some way with the respiratory tract. Thorough examination of these cases, perhaps repeated examinations, will be required before the site of the trouble is definitely located, when it will invariably be found somewhere between the anterior nares and the thorax. The stomach cough, the nervous cough, or the teething cough formerly stood for the persistent cough which could not be accounted for by physical examination of the chest or by mere inspection of the throat. They are frequently referred to by the older writers.

An adherent pleura and enlarged tonsils without adenoids are accountable for a very small number of these cases. An elongated uvula, to which these obscure coughs have also been attributed, is very rarely a cause.

An immense majority of these obscure coughs in children are due to adenoid vegetations with or without enlarged tonsils. A child with such a cough may have the typical adenoid face, mouth-breathing, and other signs referred to (see Adenoids, page 448), or these symptoms may be entirely absent. It is the latter type of case that is particularly puzzling and apt to be overlooked. On account of the absence of mouth-breathing and other symptoms of nasal obstruction, the possibility of adenoid vegetations has been ignored. In these cases careful inquiry will usually elicit the history of frequent colds, or what is styled "catarrh," as there is more or less serous discharge from the nose, or the child is said to "take cold in the head easily." Digital examination of the nasopharyngeal vault will reveal a fringe of soft adenoid growth at the upper portion of the posterior pharyngeal wall, not large enough to produce obstruction, but actively secreting. This secretion, if not profuse, is partially evaporated in the nostrils, or if profuse, is discharged from the nostrils or passes backward over the posterior pharyngeal wall, thus provoking cough, when the child is up and about. When the child rests on his back, the secretion naturally flows over the posterior pharyngeal wall, and a cough is the result. Time and again I have relieved the most obstinate cough by curet-

ting and removing this sponge-like tissue. In one patient, a boy two years of age, who had been coughing hard for ten days with paroxysms and vomiting, a diagnosis of pertussis had been made by a member of the family who had seen many cases of whooping-cough, and also by myself. Adenoids were found to be present in a slight degree. Their removal was advised, with the idea of making the coughing attacks less severe, when, greatly to our surprise, the coughing ceased at once, not a paroxysm occurring after the growth was removed. The cough was due to the adenoid vegetations and not to pertussis.

Adherent pleura, non-tuberculous, as previously mentioned, is occasionally a cause of persistent cough. Autopsies upon children dying with diseases other than respiratory often show these pleuritic adhesions, which are not suspected during life. A little girl twelve years of age was brought to me because of a persistent cough. The child was otherwise well and gaining in weight. She had been treated with expectorants, cod-liver oil, and the usual medication, without avail. The cough remained unchanged and was influenced only by opiates. A very careful physical examination revealed friction râles, covering an area the size of a half dollar, at the base of the right lung adjacent to the spine. They were heard only on forced inspiration and had been overlooked in the previous examination. It had been diagnosed as a "nervous cough."

Tracheitis will produce a cough, severe and intractable, with no signs in the chest. In these cases, however, there is no chronicity, the cough being sudden in its development. It is usually accompanied by slight fever, and if the child is old enough he will aid us by referring to the sense of discomfort and tightness which exists over the upper portion of the chest. Sometimes the sensation will be described as a burning, which is located directly over the trachea.

The most frequent cause of the temporary cough seen daily in children's work need only be referred to. It is an acute inflammatory condition of the mucous membrane of the respiratory tract, involving most frequently the fauces, the larynx, and bronchi.

Incipient tuberculous infiltration in any portion of the lungs or pleura may produce the persistent cough. Thorough physical examinations and careful observation of all the cases for a few days will make a diagnosis possible.

Pertussis without the whoop or vomiting may cause a persistent cough. It runs its course and subsides in from four to eight weeks. A diagnosis is possible only when there is a history of exposure to the disease. The treatment for the various conditions producing cough is referred to under their respective headings.

BRONCHITIS

Bronchitis in children may be divided into three types: *primary*. *secondary*, and *chronic*.

Primary bronchitis is usually the result of exposure. It occurs in all classes and conditions of children. In New York city it is a very prevalent disease during inclement weather and is indirectly the cause of many deaths. Rachitic and otherwise poorly nourished children are particularly predisposed to attacks. The younger the child, the greater the susceptibility and the more dangerous the affection.

Secondary bronchitis is most often associated with measles, whooping-cough, and bronchopneumonia, although it may be a complication of almost every ailment of early life.

Chronic bronchitis is somewhat rare in young children. It is seen most frequently in asthmatics, in slow convalescence after bronchopneumonia, and is always present in chronic pulmonary tuberculosis.

The onset of an acute attack of bronchitis is usually sudden. There is cough, followed by fever which is seldom high, occasionally touching 102° F., but almost never remaining above this point for any length of time. The usual temperature range is from 100° to 102° F., the respirations are slightly accelerated, rarely above thirty per minute, and there is moderate prostration. In a severe attack the appetite is interfered with, the child is restless, peevish, and shows general discomfort. Examination of the chest early in the attack will reveal a harsh, rough respiratory murmur, pretty evenly distributed all over the lungs. Sonorous, sibilant, and the various types of mucous râles make their appearance in from twelve to twenty-four hours. Among thousands of these cases I have never seen a single uncomplicated bronchitis with a temperature range above 102° F. When the temperature gets above this point, or higher, and remains there, there has always been found a complication of some sort—something other than the bronchitis to help account for the fever. Often this is tonsillitis, gastro-enteric disturbance, or a beginning bronchopneumonia. With a temperature ranging above 102° F. and respirations of forty or over, we may be almost certain of a developing pneumonia.

The duration of an attack of bronchitis is ordinarily stated to be from five to ten days. This is an error. The duration depends to a slight extent upon the child, but to a much greater degree upon the method of treatment. A primary case properly managed should be well in five days. Many cases are not treated at all by the physician, because he is not consulted, and some cases even then are not properly treated. It is these cases of neglected bronchitis which furnish a great majority of our cases of bronchopneu-

monia, a disease which contributes largely to the mortality of children under five years of age.

Signs of consolidation in the lung are not necessary for the diagnosis of pneumonia. Cases very often reported as capillary bronchitis, in which there is rapid breathing—40 to 60 a minute—high temperature, 103° to 105° F., and marked prostration, show at autopsy the pneumonic elements which gave during life no other signs in the chest than a diminished respiratory murmur and many fine mucous râles.

Treatment.—Before indicating what should be done in a case of bronchitis it may be as important, by way of emphasis, to advise what *not* to do. Do not seal the room up tight by keeping all the windows closed. Do not use an oil-silk jacket lined with wadding or any other material. Do not allow the child to be wrapped in blankets and shawls and held against a warm adult body. Do not give the child large doses of so-called "expectorants"—a teaspoonful of a heavy syrup. The temperature of the room should be kept as near 70° F. as possible. There should always be direct communication with the open air. A window lowered an inch or two from the top, or the window-board described on page 44, is a safe means of assisting in ventilation. The child should be kept in its crib and wear the night-clothing it was accustomed to wear in health. Many children with bronchitis do not feel particularly ill and rebel against the enforced inactivity; for such as cannot be kept under the covers, a pinning-blanket or a bath-robe may be worn while the child sits up in bed, but it should not be allowed to sleep in either.

The Diet.—If there is little or no fever, the diet need be reduced but little. If there is fever, 100° to 101.5° F., with restlessness and irritability, the food should be reduced in strength, giving the same amount of fluid as in health, the reduction being made by giving plain boiled water frequently to drink between the feedings. The diet of a nursing baby can best be reduced by giving him a drink of water before each nursing, and shortening the time allowed for nursing from one-third to one-half. We will thus avoid digestive disturbances, which often act as a very serious complication to the existing disorder. Older children, those on a mixed diet, may be given toast, cocoa, milk, broths, gruels, and fruit-juices.

Steam Inhalations.—Properly administered medicated steam inhalations are of greater service in bronchitis, particularly in young infants, than any other measure of treatment which we possess. The steaming is best administered when the child is placed in its crib, which is covered and draped with sheets. The croup kettle (Fig. 27) with alcohol lamp attachment is the most convenient means for generating steam. The nozzle of the croup kettle, which rests on a chair or stand, is carried under the tent at a safe distance from the child's hands and face. For inhalation, creosote has given better results

than has any other drug. Ten drops are added to one quart of boiling water and the steaming continued for thirty minutes. Ordinarily, in an urgent case, steaming of thirty minutes is given at two-and-a-half-hour intervals day and night until the child recovers. Older children and those in whom the condition is not grave need not be steamed after the bedtime of mother or nurse. It is well to allow a change of air in the enclosed space at least three times during the steaming. This is done by raising the sheet for a moment or two and then replacing it.

Counter-irritation.—Counter-irritation of the skin over the thorax is another very useful method of treatment in bronchitis. Full instructions must be given the mother and nurse as to how the counter-irritant is to be applied, or the application will be very indifferently made. In my hands the mustard plaster (page 515) has been the most convenient means of counter-irritation, and has given the best results. It is well to begin with a strength of one part of mustard and two parts of flour. Two or three applications of this strength may be made. Later, when the skin becomes sensitive, the plaster is made weaker by the addition of more flour, one part of mustard to five or six of flour. In order to be effective the plaster should remain in contact with the skin from five to fifteen minutes, until a diffuse blush appears. The plaster is prepared as follows: Mix the mustard and the flour, using lukewarm water until a paste of medium thickness is formed. This is to be spread on cheese-cloth, old linen, or thin white muslin to a thickness of about $\frac{1}{8}$ of an inch. Over this one thickness of cheese-cloth is placed. The size of the plaster depends upon the age of the child and the area of lung involved. In a case of general bronchitis the entire thorax, front and back, should be covered. It is easier to make two plasters which meet under the arms than to make one to encircle the thorax, as is sometimes done. A circle is cut out for the arms at the upper corners. The plasters are sufficiently large to meet at the sides, as mentioned above, when they may be pinned together. When all is completed, it really amounts to a mustard jacket. The plaster may be applied from two to four times daily, depending upon the urgency of the case. Counter-irritation thus made is of great service early in the attack—during the stage of acute congestion. I question whether plasters are of much use after two or three days have elapsed. After removing the plaster an application of vaselin is grateful to the patient.

FIG. 27.—CROUP KETTLE WITH ALCOHOL LAMP ATTACHMENT.

Mustard Baths.—A mustard bath (page 30), ½ ounce of mustard to 6 gallons of water at a temperature of 110° F., is of considerable service in the very acute cases in young children with extensive involvement of the fine tubes—a type of case usually known as "capillary bronchitis." These cases are very apt to develop into bronchopneumonia, if they are not such from the beginning. There is considerable shock, the hands and feet are often cold, the respiration rapid, and the child considerably prostrated. The bath may be repeated with advantage at intervals of from six to eight hours. It will not be of value after forty-eight hours.

Drugs.—The value of drugs in the management of this disease has been considerably overestimated, and they are mentioned last because they are the least important of the remedial measures referred to. During the first stage of bronchitis, that of engorgement, indicated by a short, dry cough, and rough, sonorous breathing on auscultation, small doses of castor oil and syrup of ipecac furnish us our best medication; from the first to the third year, two to three drops of castor oil and two to three drops of syrup of ipecac may be given every two hours; after the third year, three drops of syrup of ipecac and five drops of castor oil every two hours. At least eight doses should be given in twenty-four hours. Ordinarily, after twenty-four hours, auscultation will reveal a freer secretion in the bronchi, the fever will diminish, and the child's cough will become loose and less severe. The benefits from the oil and ipecac will be accomplished in from forty-two to seventy-two hours, when this medication should be discontinued.

If the cough and the chest sounds tell us that the bronchi are not yet clear, a combination of tartar emetic, powdered ipecac, and ammonium chlorid may be used. For a child under six months of age a powder or tablet containing $\frac{1}{150}$ grain of tartar emetic, $\frac{1}{80}$ grain of powdered ipecac, and ¼ grain of ammonium chlorid should be given at two-hour intervals, eight doses in twenty-four hours; from six months to one year, tartar emetic $\frac{1}{100}$ grain, powdered ipecac $\frac{1}{60}$ grain, ammonium chlorid ¼ grain, at two-hour intervals, eight doses in twenty-four hours. If the cough is very annoying and severe, requiring a sedative, ⅛ grain of Dover's powder may be added to each dose for children under six months and ¼ grain for children over six months of age. From one to three years of age, tartar emetic $\frac{1}{100}$ grain, powdered ipecac $\frac{1}{40}$ grain, ammonium chlorid ½ grain at two-hour intervals, eight doses in twenty-four hours, ½ grain of Dover's powder to be added to each dose if the character of the cough demands it. The tablet or powder, whichever is employed, should be given in two teaspoonfuls of thin gruel or plain water. After the third year $\frac{1}{80}$ grain of tartar emetic, $\frac{1}{20}$ grain of pulverized ipecac, and 1 grain of ammonium chlorid may be given every two hours, eight doses in the twenty-four hours. The

use of tablets or powders should be insisted upon, particularly in very young children. The large doses of ammonium salts and ipecac in heavy syrups are to be avoided because of their liability to produce stomach disturbance.

The treatment of secondary bronchitis depends to a certain extent upon the disease with which it is associated, and the treatment should be modified accordingly. Counter-irritation and medicated steam inhalations ordinarily can be used, as they interfere but little with other necessary treatment.

In chronic bronchitis the removal of enlarged tonsils and adenoids, fresh air, and change to a dry climate, if possible, are our best means of treatment. In addition, general supporting treatment is to be advised (see The Management of Delicate Children). Creosote in small doses, 1 to 3 minims after meals, for a child from two to five years of age, has seemed to me to be of service with some of these children. My greatest success, however, with these cases has been achieved by ignoring the bronchitis temporarily and putting the child in the best hygienic surroundings. Outdoor life inland and a nutritious diet are far better than drugs. In many of these cases, under such a régime, the disease for which the child was brought for treatment entirely disappeared without any specific medication whatever, showing that the bronchial catarrh was nothing more or less than a manifestation of a greatly reduced vitality.

RECURRENT BRONCHITIS

Recurrent bronchitis without the association of asthma is occasionally encountered. A case of this kind was seen by me five months ago which was so typical that I will give a brief history of it as taken from my records:

Illustrative Case.—A plump, well-nourished, four-year-old girl was brought with a history of attacks of bronchitis lasting from five to seven days at intervals of not longer than three weeks. The physical examination was negative. The attacks commenced when she was two years of age and had continued for two years. There never was a temperature of over 100° F. with the attacks and the child was not physically ill. There had never been cyclic vomiting, tonsillitis, or rheumatism. The father was a sufferer from chronic rheumatism. The patient was given a diet suitable for her age (page 134), meat being allowed every second day. She was taking considerable sugar, which was greatly reduced, only enough being allowed to make the food palatable. She was given the following prescription:

℞. Sodii salicylatis (wintergreen) ..... gr. xxxvj
Sodii bicarbonatis ..... gr. lxxij
Elixiris simplicis ..... ℥v
Aquæ ..... q. s. ad ℥ij
M. Sig.—One teaspoonful twice daily after meals.

The above prescription was given for five days, followed by an interval of five days' rest. This procedure has now been continued for five months, during which time there has been no bronchitis. This period includes the spring and one summer month, but as the attacks had occurred during the previous summer as frequently as during the winter, the season of the year cannot be considered an element in the relief of the patient. As when a child develops joint or bone disease, the family can usually recall an injury or fall of some sort to account for the trouble, so also, in the event of bronchitis, an exposure, a change of clothing, or a change in the weather will usually be regarded as a cause of the attack.

In the case above cited, and in others also, such factors evidently have had very little, if anything, to do with the bronchitis, for under the same climatic conditions the attacks have ceased when attention was given to the constitutional condition, and proper diet and medication prescribed. The patients are usually of gouty or rheumatic ancestry. Some of them have had growing pains, and others chorea.

General Management.—The management of these cases is as follows: The child should lead an active outdoor life when climatic conditions allow. There should always be communication between the sleeping-room and the outer air. Red meats, including beef, mutton, and lamb, are given only every second or third day. Sugar is allowed only in sufficient amount to make the food palatable. If the case resists treatment, sugar is discontinued and saccharin is substituted. Skimmed milk is given as a drink, eight ounces being allowed both for breakfast and supper. Fruits, green vegetables, and cereals well cooked and suitable for the age are given freely. There must be a free evacuation of the bowels daily. If there is a tendency to constipation, the oil treatment (page 185) is prescribed. These patients are not influenced by the usual treatment for bronchitis, so that expectorant drugs may be omitted. Large doses of bicarbonate of soda do more toward shortening the attack than does any other form of medication. For a child five years of age, five grains should be given at two-hour intervals. The interval treatment with diet must be relied upon to prevent a recurrence of the attacks. Salicylate of soda (wintergreen) is given for five days, in doses of from three to five grains, well diluted, after meals. The salicylate is then discontinued and the bicarbonate is given for five days in the same dosage, when the salicylate is resumed. In this way, by alternating the two drugs or by giving aspirin when the salicylate disagrees, the treatment is continued for months. As the case improves, an interval of rest from all medication is instituted. If it is more convenient, the salicylate and the bicarbonate of soda may be given at the same time. The skin in these cases should be kept active; once daily the child should be given a tub-bath in luke-

warm water. After the bath, a cool spray or spinal douche is used, the temperature of the water ranging from 50° to 70° F. An excessive degree of cold is not advisable; it should be sufficient, however, to insure good reaction after a brisk rubbing with a rough towel.

BRONCHIAL ASTHMA

By bronchial asthma in children we understand a condition characterized by recurrent attacks of bronchial spasm of widely varying degrees of intensity and duration, toxic or reflex in origin, associated either with an involvement of the nasopharynx or the bronchial mucous membrane in the form of turgescence or inflammation. I have come to divide my cases of asthmatic children into two classes. To the first class belong comparatively few: those in whom paroxysms are produced by direct irritation, as by the pollen of plants or the odors of animals or flowers, which produce what is known as "hay-fever" and the associated asthmatic condition. Hay-fever is rarely seen in children under five years of age. In by far the greater number of my patients, which constitute the second class, who have suffered from asthma there could be discovered the so-called "lithemic diathesis"; in other words, there was a gouty or rheumatic association. Among these, cases of recurrent bronchitis (page 274) and asthma are included. In not a few cases of recurrent bronchitis there is asthma of such a slight degree that it may escape observation. In others it is entirely absent. Repeated acute attacks of asthma give rise to pulmonary emphysema which emphasizes the necessity of early medical treatment. I have two patients under my care, both under ten years of age, who are hopeless invalids because of marked emphysema due to repeated attacks of asthmatic bronchitis. Both cases were neglected in their early management. In the lithemic type the attacks sometimes occur with such regularity as to suggest the "explosion" seen in cyclic vomiting. Enlarged tonsils and adenoids may exist as accessory exciting causes. Otherwise they cannot be looked upon as etiologic factors.

Illustrative Case.—A girl eight years of age was brought to me three years ago with the history of an attack of asthmatic bronchitis every month for several years. The asthma was not severe. It was present at the onset of the attack and lasted perhaps for twenty-four hours. The bronchitis usually cleared up in about five days. She had spent but little time in New York because of her so-called frequent "colds." Her mother brought the child to me in view of a contemplated change of residence. In Florida and Lower California, where she had passed the winter, the attacks had occurred, but were mild in character. As soon as she returned home the attacks returned, keeping her from

school for one week out of every four or five. In taking the personal history, the matter of adenoids and tonsils was mentioned, when the mother hastened to inform me that the adenoids and tonsils had been removed twice, thus demonstrating that they were not a factor in the case. The child had never suffered from rheumatism or cyclic vomiting. Aside from revealing a mild secondary anemia and slight emphysema the physical examination proved negative. As to her family history, I learned that all of the child's antecedents on both sides, for three generations, had suffered either from rheumatism or gout. Her mother had been a lifelong sufferer from rheumatism. Upon close questioning as to the child's diet, it was found that it consisted of red meat twice daily; she "hated" vegetables, took cereals only when "loaded" with sugar, and drank milk only when two teaspoonfuls of sugar were added to each glass. She had candy and cake *ad libitum*. She was recovering from an attack of bronchitis when I saw her, and was taking an expectorant cough-syrup. This was discontinued, red meat was permitted but twice a week, the sugar was largely reduced, saccharin being used in the milk to satisfy the abnormal craving for sweets. She was bribed by the mother to eat green vegetables and cereals. The desserts consisted largely of stewed fruits flavored with saccharin. Candy, cake, and pastry were forbidden. She was given four grains of the salicylate of soda (wintergreen) three times daily for five days, which was followed by ten grains of the bicarbonate three times daily for five days; then for five days there was no medication. This treatment was continued for six months. During the following six months the salicylate and the bicarbonate of soda were given but five days each out of each month, and during the entire year but one mild attack of bronchial asthma occurred.

A most striking case of periodic asthmatic bronchitis occurred in a boy nine years of age.

The father had had inflammatory rheumatism. Of the mother's family, the grandmother was an invalid with rheumatism. The grandfather was troubled slightly with it.

The boy was pale, but well nourished, very active mentally. His weight was sixty-eight pounds. He had had chicken-pox and one attack of tonsillitis. The blood examination showed 78 percent of hemoglobin, 5,500,000 red cells, and 8000 leukocytes. The urine was negative. For the previous year he had a great many attacks of asthmatic bronchitis. The mother stated that they occurred once every three or four weeks. Previous to this time there had been very frequent colds, so many that the boy's attendance at school had been practically nil. The mother had discovered that sugar did not agree and very little had been given. He was very fond of red meat, however, and wanted it three times a day. He was given it twice a day.

A diet of green vegetables, fruits, and milk cereals was ordered to be given freely. In addition, eggs or bacon was to be given for breakfast. Red meat to be given three times a week, poultry three times a week, and fish once a week. Sugar was excluded absolutely, saccharine being used. Asparin in two-grain doses was given after each meal with five grains of bicarbonate of soda.

This was the treatment for three months, during which term there was one attack of the asthmatic bronchitis. This responded to ipecac, antipyrin, and soda bromid. Other than one or two slight colds, the boy has experienced no trouble during the past winter. He has lost but little time at school. At the end of seven months he had gained seven pounds in weight.

The bicarbonate and asparin were given continuously for three months. Since then they have been given alternately, each for five days—*i. e.*, two grains of asparin three times daily for five days, then five grains of bicarbonate of soda twice daily for five days.

Treatment.—The management of bronchial asthma consists of care during the attack, and the interval treatment, the latter being by far the more important. In infants and young "runabouts" with this type of trouble, there is usually considerable bronchitis, and this requires our attention. I have found, in addition to the usual laxatives, calomel or castor oil, that a combination of syrup of ipecac, antipyrin, and bromid of soda gives the most prompt results as far as *internal medication* is concerned. For a child six months of age the following prescription has been found useful:

℞. Syrupi ipecacuanhæ.....gtt. xviij
Antipyrinæ .....gr. vj
Sodii bromidi.....gr. xviij
Syrupi rubi idæi.....℥v
Aquæ.....q. s. ad ℥ij
M. Sig.—One dram every two hours—six doses in twenty-four hours.

For one year of age:

℞. Syrupi ipecacuanhæ.....gtt. xxiv
Antipyrinæ .....gr. xij
Sodii bromidi.....gr. xxiv
Syrupi rubi idæi.....℥v
Aquæ .....q. s. ad ℥ij
M. Sig.—One teaspoonful at two-hour intervals—six doses in twenty-four hours.

For a child from two to three years of age:

℞. Syrupi ipecacuanhæ.....gtt. xxxvj
Antipyrinæ .....gr. xviij
Sodii bromidi.....gr. xxxvj
Syrupi rubi idæi.....℥v
Aquæ.....q. s. ad ℥ij
M. Sig.—One teaspoonful in water at two-hour intervals—six doses in twenty-four hours.

In addition to the internal medication, the child will often be greatly relieved by *stimulant inhalations* as described under Spasmodic Croup (page 262). If the condition is urgent, the inhalations may be given for thirty minutes with thirty minutes' rest. Mustard in the proportion of one part of mustard to two parts of flour (page 272), so applied as to envelop the entire thorax, will often relieve the spasm sufficiently to reduce the respirations from ten to twenty a minute. The mustard should remain on long enough to redden the skin and should not be repeated oftener than once in four hours. The cold-air treatment in bronchial asthma is contraindicated, regardless of the age of the patient. Warm moist air at from 68° F. to 70° F. is best. A sudden blast of cold air may be sufficient to increase the severity of the paroxysms to a marked degree. Ventilation, however, is a necessity in these cases. The best means of obtaining it is by the use of two rooms, one of which may be aired while the other is occupied. Before the child is changed to the aired room, its temperature should be raised to that of the other.

In older children after the fifth year the bronchial spasm may be considerable, and more active measures may be required to furnish temporary relief. Here the methods usually employed for the same purpose in adults may be brought into use. A few whiffs of chloroform will often be effective. Fumes of nitrate of potash paper will sometimes be of service. At this age, also, a combination of antipyrin and bromid of soda may be brought into use. For a child from five to ten years of age, three grains of antipyrin with from six to ten grains of bromid of soda, repeated in two hours, will often be followed by a cessation of the paroxysm. As soon as the spasm subsides the sedatives should be discontinued. I have never found it necessary to give morphin hypodermatically or otherwise in these cases. In a very severe case, in a girl eight years of age, a combination of antipyrin and codein in full dosage was required to control the paroxysms. She was given one-fourth grain of codein and four grains of antipyrin at two-hour intervals until three doses had been given.

The interval treatment for the bottle-fed consists in a reduction of the sugar to one-half the amount suitable for the age and the use of one grain of bicarbonate of soda for each ounce of the milk food given. The bowels must be kept properly open, although constipation or intestinal toxemia has never appeared to me to be an important factor in asthmatic children. The interval treatment for older children is most important, for by it we are able to postpone the attacks. These cases, as I have indicated, are usually in lithemic subjects, and the scheme of management followed out is the same as for rheumatism, chorea, recurrent bronchitis, and cyclic vomiting. Sugar is reduced to a minimum, red meat is given

not oftener than every second day, and then only in moderate amounts. The child's proteid nutrition is maintained by the use of a high-proteid cereal, such as oatmeal, and purées of dried peas, beans, and lentils. The eating of green vegetables is encouraged. Food between meals is forbidden. Fruits are used in moderation and an active outdoor life is encouraged. At bedtime the child is given a brine bath (page 31), followed by a vigorous dry rub. The mother or attendant is instructed that one bowel evacuation daily must be insured. The medication consists of bicarbonate of soda, from five to ten grains a day for five days, alternating with the salicylate of soda (wintergreen) in doses of from three to five grains three times a day. This is continued for a month or two until its effect on a recurrence is noted. If the salicylate of soda disturbs the digestion, the same quantity of aspirin may be given. The further continuation of the medication depends upon the effect produced. Usually in two months the salicylate may be given in smaller doses. Interrupted medication, however, should be continued for several months. When my cases with a bad family history have been relieved, I continue the diet permanently, giving the medication for but five or ten days and then omitting it for sixty or eighty days, when it is again given for a short time, continuing thus for as long as may be thought best in the individual case.

BRONCHOPNEUMONIA; CATARRHAL PNEUMONIA

Catarrhal pneumonia, on account of its large mortality, and because of its frequent appearance as a complication of almost every disease of infancy, is one of the most formidable ailments which we are called upon to treat. The disease is usually described as primary or secondary. Among the several hundred cases which have come under my observation comparatively few—less than 5 percent—were primary. Those described as primary usually follow a bronchitis, often a neglected bronchitis. The disease varies considerably as regards its severity, depending on the age and condition of the child, the nature of the infection, and the amount of lung involved. It is most fatal when associated with diphtheria or measles.

Catarrhal pneumonia demands our most careful attention, not only on account of the delicate organs attacked, enclosed in weak thoracic walls, but because—unlike lobar pneumonia, scarlet fever, typhoid fever, and many other diseases of early life—it has no self-limitation, no cycle. While in the other diseases mentioned we are required only to assist a patient through the various stages, in catarrhal pneumonia we must do more, for here a cure is demanded.

Treatment.—Every child at the commencement of an illness has a definite resistance to it. In catarrhal pneumonia, for the reasons just

given, it must be our effort to preserve every strength unit which the child possesses. An immense amount of vitality is wasted in sick children because of irritability, restlessness, and loss of sleep. One of the first duties in a given case is not to give this or that drug, or use this or that local application, but to make the child comfortable—to put him in the best position to withstand disease. We must establish a sick-room régime which will make this possible.

The Sick-room.—The value of a constant supply of fresh air is too little appreciated. In every case there should be a direct communication between the sick-room and the open air, throughout the attack. Various means of ventilation have been devised, of which the window-board (page 44) is the most effective, as it separates the sash and allows the free entrance of a current of air which is directed upward. If plenty of fresh air at a proper temperature were available during the early part of the illness, there would be much less use for tanks of oxygen later.

An absolute necessity in a sick-room is a good thermometer. In pneumonia cases it should never register above 70° F. There is marked tendency to coddle, to wrap, to overclothe, pneumonia patients. The patient requires, even during the winter, absolutely nothing more than a medium-weight flannel shirt, a band, if one is ordinarily worn, and the usual night-dress. Some years since I discarded the oiled silk jacket. It is cumbersome, it is impossible to keep clean, and it overheats the patient. Given an infant with catarrhal pneumonia, have him heavily clad, keep him in an unventilated, overheated room, in close contact with an adult body, and you have a patient who is tremendously handicapped. There is but one place for a sick infant, and that is in his own roomy crib.

Diet.—In every illness with fever, the digestive capacity is considerably reduced. If the usual milk diet is continued, we are very liable to have a gastro-enteric infection added, oftentimes as a serious complication, to the existing disease. In the breast-fed a drink of water is ordered for the child before the nursings and between them. The nursing hours should be the same as in health, but the time allowed for each nursing should be reduced from one-third to one-half. In the bottle-fed the milk strength should be reduced from one-third to one-half by dilution with water, the quantity remaining the same. Children from two to four years of age are put on a diet of diluted milk, gruels, and broths.

Bowels.—Normal bowel function is more necessary for the sick than for the well. There should be at least one stool in twenty-four hours.

General Treatment.—Having placed the child under the best dietetic and hygienic conditions, we are in a position to use medication to a much better advantage. But in its use, and in performing the various offices for the patient, it must be our effort to disturb

him as little as possible. In our anxiety to *do*, we are very liable to *overdo*, with disastrous results. If a well child were given syrup expectorants, stimulants, baths, and local applications, something being done for him every hour or two in the twenty-four, he would have to be a strong child to withstand the treatment. We should treat our ill with still greater consideration. Make the intervals between which the child is to be disturbed at night as long as possible by giving food, medicine, and local treatment at one time. When possible, I always endeavor to make the interval at least three hours.

Steam Inhalations.—Among the distinctly remedial measures, aside from those administered internally, steam inhalations with creosote deserve an important place. The patient is placed in its crib, which is covered and draped with sheets so as to make a fairly tight enclosed space. The apparatus necessary is an ordinary croup kettle (see page 261). Ten drops of creosote are added to one quart of water and placed in the kettle. The nozzle of the kettle is introduced between the sheets at a safe distance from the child's face and hands, the steaming being carried on for thirty minutes every three hours. The sheets should be parted slightly about every ten minutes, to allow a renewal of the air. The inhalations are to be given whether the patient is sleeping or waking. As he improves, they may be given less frequently until normal respirations and the chest signs tell us they are no longer required.

Counter-irritants.—The application of counter-irritants to the skin over the thorax is, to my mind, of great service in cases in which there is much bronchial catarrh, which includes, of course, most cases. In order that a counter-irritant may be of service, a distinct red blush must be produced on the skin. Turpentine diluted with oil,—one-third turpentine and two-thirds oil,—when briskly rubbed on the parts for a few minutes, produces a fairly satisfactory counter-irritation. The old-fashioned home-made mustard plaster has served me well as a counter-irritant. Written directions should always be given for the preparation of the plaster, and the boundaries of the area of the skin to be covered should be outlined with a pencil on the skin's surface. If the nurse or mother is told merely to put a mustard plaster on the chest, a plaster the size of a man's hand will usually be placed somewhere between the umbilicus and the chin! For the first two or three applications one part of mustard to two parts of flour is used. This is moistened with hot water and made of the consistency of a rather thin paste, which is then spread upon cheese-cloth, old muslin, or linen, cut to the desired size. The plaster is readily held in position by a bandage of any thin material extending around the chest. When the skin is well reddened, usually within from five to fifteen minutes, the plaster is removed and vaselin or sweet oil applied. I never use a plaster oftener than once in six hours, and then only in the severest cases. Ordi-

narily, two or three applications in twenty-four hours are sufficient. If the plasters are continued for several days, in order to avoid blistering, it will be necessary to make them much weaker after a day or two—one part of mustard to five or ten of flour. Counter-irritation is particularly effective when used at the commencement of an attack.

Mustard Baths.—In cases of sudden onset, with high fever, rapid breathing, and cold extremities, a mustard bath—one tablespoonful of mustard to six gallons of water at 110° F.—will often furnish marked relief to the immediate symptoms. Autopsies on these cases show a general congestion of the internal organs, with intense congestion of the lungs. The bath may be repeated at six-hour intervals. This type of case is usually very rapid in its development, the child being relieved or dead in from thirty-six to forty-eight hours. By "relieved" we do not mean that the child has recovered, but that the acute urgent symptoms have subsided. In my opinion only these cases should be considered primary.

Drugs.—The internal medication is, to a large extent, symptomatic. In any disease a great deal of harm may be done to young children by the thoughtless use of drugs. In catarrhal pneumonia it is particularly necessary that, in our endeavors to assist the patient, we do nothing to harm him, for we are treating a disease in which his powers of resistance count for everything. In young children, even in health, the digestive functions are very easily disordered. In illness with fever, with the accompanying nervous exhaustion, the stomach is most easily disturbed, the child is not properly nourished, and his powers of resistance are markedly diminished.

Expectorants must be given with care and are better prescribed in the form of tablets or powders. The use of heavy syrups of wild cherry, tolu, etc., with large doses of the ammonium salts, only adds to the burden of the patient. For a child one year of age with catarrhal pneumonia, $\frac{1}{100}$ grain of tartar emetic and $\frac{1}{40}$ grain of ipecac answer well as an expectorant. If the cough is very severe and persistent, $\frac{1}{4}$ grain of Dover's powder in tablet form with sugar of milk dissolved in at least two teaspoonfuls of water, may be given, preferably after feeding, not oftener than once in two hours. The ammonium salts so generally used in catarrhal pneumonia as routine treatment are badly borne by the stomach. The muriate of ammonia is of some value during resolution, but to a child two years old it should not be given in larger doses than $\frac{1}{2}$ grain well diluted, at two-hour intervals; personally, however, I rarely use it. With high fever and great restlessness, which are not affected by sponging, and where for any reason rational bathing is impossible, a combination of caffein, Dover's powder, and phenacetin may be used. For a child one year of age I would give $\frac{1}{6}$ grain of caffein, $\frac{1}{2}$ grain of Dover's powder, and $1\frac{1}{2}$ grains of phen-

acetin at about four-hour intervals. In giving Dover's powder it is well to watch the bowels, as constipation often follows its use.

Heart stimulants are usually necessary, and in their selection two points are to be considered—their effect on the heart and their effect on the stomach. But, first, what are the indications for the use of a heart stimulant? Ordinarily, I think, they are used too early. A heart stimulant should never be given simply because a child has pneumonia or diphtheria or scarlet fever, but it should be given in pneumonia or diphtheria or scarlet fever as soon as the heart needs assistance. And, briefly, there are two conditions to guide us, a very rapid pulse or a soft, usually not rapid, pulse with a tendency to irregularity. In a general way, I believe that a heart which is beating at the rate of 150 a minute during quiet or sleep, and which is not strengthened by sponging or packs, needs assistance, and the drug which has served me best is tincture of strophanthus, which acts as a direct stimulant to the heart muscle. The pulse, by its use, is made stronger, fuller, and less rapid. When the heart's action shows a tendency to irregularity, with a soft, easily compressible pulse, then strychnin is the remedy. For a child one year of age one drop of strophanthus in water may be given every three hours, or $\frac{1}{300}$ grain of strychnin every three hours, to be increased to $\frac{1}{200}$ or even to $\frac{1}{100}$ grain every three hours for a few doses if the case is carefully watched for symptoms of strychnin poisoning. Strophanthus and strychnin possess advantages over all other stimulants in that they do their work and have no unpleasant effect on the stomach, as is the case with alcohol, digitalis, and the ammonium preparations. If the condition is very urgent, strophanthus and strychnin may be used in combination. Digitalis I rarely employ because of its tendency to interfere with digestion. Alcohol in the form of whisky or brandy is very rarely of great service in catarrhal pneumonia. It may stimulate the heart, but its prolonged use greatly upsets the stomach. It should be withheld until late in the disease, when other means of stimulation fail. Then, given in large amounts, it may be the means of saving the patient. One-half dram of whisky or brandy, well diluted, may be given every hour or every two hours to a child one year of age. However, the cases of catarrhal pneumonia actually saved by the use of alcohol are few indeed. One three-hundredth grain of nitroglycerin every three hours for a child one year of age is of service in cases where there is marked cyanosis with cold extremities. Its use should be discontinued as soon as improvement in this respect is noticed. The one unpleasant effect that I have observed from its administration is its tendency to produce headache and marked restlessness.

Baths.—A sponge-bath at 95° F. for cleansing purposes may be given daily.

What is to be our guide in dealing with the temperature? At what degree of temperature are we to interfere, the rectal temperature alone being considered? This depends to a great extent upon what is behind the fever and the effect of the fever upon the individual patient. If a child has a high fever and is more comfortable when it is reduced,—if he will digest his food better and sleep better,—it is our duty to reduce it. Further, by reducing the temperature we lessen the work of the heart, saving it oftentimes many beats a minute. Usually when the temperature has a tendency to run above 104° F., interference is of advantage, and the best means at our command is the use of local applications of water in the form of sponge-baths or packs. If the temperature is easily controlled, a sponge-bath will answer our purpose. Either salt or alcohol may be added to the water. Ordinarily two teaspoonfuls of salt to a quart of water, or one part alcohol to three parts water, is ample. Cold water thus used serves two purposes—it acts as a sedative and it reduces the fever. Cold sponging, while not controlling the fever as effectually as does a bath or a pack, possesses the advantage that the most unskilled can use it. For sponging, the child should be stripped and covered with a flannel blanket, the sponging being done under the blanket. In order not to antagonize or frighten the child, it is best to begin with the water at 95° F. and gradually to reduce it to 70° or 75° F. by the addition of ice or cold water. The sponging may be continued from ten to twenty minutes, and should not be repeated at shorter intervals than ninety minutes. After the sponging is completed the skin should be rubbed briskly for a few minutes with a dry towel. If the temperature is not readily controlled in this way, it is best to use other means, as too frequent sponging exhausts the patient. As a means of controlling the temperature in children, the tub-bath has not been successful in my hands, for the reason that I have not been able by this means to control the fever. The exposure, the fright, and the necessary shortness of the bath render it very unsatisfactory.

Cold Pack.—By far the best means at our command for controlling a continued high fever is by the use of the cold pack (page 503). Properly applied, it is without the slightest danger. It is prepared as follows: A large bath-towel or any thick absorbent material may be used, slits being cut in one end of the towel through which the arms may pass. The towel is folded over the body, and should extend from the neck to the middle of the thighs; the arms and the legs from the knees down should remain free; a hot-water bag, carefully guarded, should be placed at the feet. The towel is moistened with water at 95° F. It is well to make the pack warm at first, so that the child will not be frightened, as shock will thus be avoided. I have known severe shock to follow in a case where a child with a tempera-

ture of 105° F. was put suddenly into a pack at 70° F. In two or three minutes the towel is moistened with water at 85° F., then at 80° F. When 80° F. is reached, it is best not to make the water any colder for half an hour, at which time the temperature of the patient is taken. If, in the beginning, it was 105° F. and then shows a slight or no reduction, the temperature of the pack may be reduced to 70° or even to 60° F. by the addition of cold water or ice, without removing the child, who is turned from side to side so that all parts of the enveloping towel may be moistened with the cool water. During the first hours in the pack, the temperature should be taken every half hour, and when it is reduced to 102° F., the child is removed and wrapped in a warm blanket. In cases of sudden and persistent high fever, the child may be kept in the pack continuously. We aim to keep the temperature between 102.5° and 103.5° F. The degree of cold necessary to control the fever in a given case will soon be learned. I recently kept in a pack for seventy-two hours a four-year-old boy, ill with lobar pneumonia. In this case a pack at 70° F. was necessary to keep the temperature at 104° F. or slightly lower. A fresh towel should be applied every three hours. An ice-bag should be kept at the head, a hot-water bag at the feet, and the patient covered with a flannel blanket of medium weight.

Oxygen.—Oxygen is of immense service in very severe cases with much lung involvement. It may be given continuously for one or two minutes out of every seven or ten. As often given, one or two minutes every half hour, it is of little or no service.

LOBAR PNEUMONIA

The onset of lobar pneumonia is usually sudden. In about 3 percent of the cases it is ushered in by a convulsion. In older children, those past the third year, there may be an initial chill. There is almost always high fever from the beginning of the attack. The face is flushed, the lips are separated and parched, and the child usually breathes through its mouth. The respiration is markedly accelerated,—forty to sixty per minute,—the end of each inspiration being marked by a peculiar sigh or groan. At this time there may be in the chest no discernible signs of the disease. The respiratory murmur over the entire thorax is rendered harsher than normal, but this is caused by the rapid respiration. Bronchial breathing and bronchial voice may be delayed until the fourth or fifth day, although they are usually present within forty-eight hours from the onset of the acute symptoms. In a case seen recently, signs of consolidation did not appear until the seventh day of the disease, and on that day the crisis occurred. It was objectively a typical case of lobar pneumonia, but without chest signs until the seventh day. A case of this type is usually referred to as a "central" pneumonia; the consolidated area being deep in the

lung tissue, and covered by normal lung, cannot be made out. The temperature at the onset will usually be from 103° to 105° F. In an average case the temperature range throughout an attack is from 103° to 105° F.

Lobar pneumonia is a distinctly infectious disease terminating, in recovery cases, by crisis. The crisis may be looked for any time after the third day of the disease, though it seldom occurs before the fifth day, the usual time being from the fifth to the ninth day of the disease. A crisis delayed beyond the ninth day means a very serious infection and a very grave prognosis. I have had recovery cases in which the crisis did not occur until the eleventh day, one on the thirteenth, and one on the fifteenth day. In eight fatal cases in the New York Infant Asylum, two died on the eighth day, two on the ninth, two on the twelfth, one on the twenty-first, and one on the twenty-fourth day of the disease.

Among the out-patient poor, lobar pneumonia frequently runs its course unrecognized. At the outdoor service of the Babies' Hospital we not infrequently have cases brought to us with lobar pneumonia in the stage of resolution. The child had a hacking cough with fever, and was supposed to be suffering from a cold or an attack of influenza. There was evidently no pain, hence nothing was suspected. In children localized pain in the chest is often absent throughout the entire attack.

Lobar pneumonia runs a limited course, with a strong tendency to recovery. It is a disease which children bear well, under proper management—a disease for which there is no specific treatment, and our efforts in restoring the patient to health are supportive only, so that the patient may be enabled successfully to withstand the disease.

Treatment.—When a child is stricken with lobar pneumonia we know that his physical strength is to be severely tested, and our first effort should be to place him in such a position that he may to the best advantage cope with the enemy. In order to do this, every detail of his daily life should so be arranged as to place all the organs of the body in the most favorable position to meet the changed conditions produced by disease. Telling the mother what to do for the fever and writing a prescription for a cough mixture is a most careless way of treating pneumonia; it is the method of the prescribing apothecary; physicians never do it. A proper régime must be established as soon as the child becomes ill. The bowel function, the room-temperature, ventilation, and sleep, as well as special medication, are to be considered. The child must be kept as comfortable as the conditions allow, and his comfort means the avoidance of everything causing restlessness or irritability, which throws more work upon the heart and diminishes his resistance to the disease.

The Sick-room.—Being usually a winter disease, the temperature of the room and the ventilation demand special attention. The temperature of the room should be kept at 70° F., or very near that figure, both day and night. Wide fluctuations in the temperature should not be allowed. A child with lobar pneumonia needs the best air that can be furnished. A large room, if at hand, should always be selected, and there must always be a direct communication with the open air. A window-board (page 44) is a convenient means of ventilation. The child should be kept in its crib, and not held on the lap of the mother or nurse.

Quiet should be maintained in the sick-room, only those in attendance upon the patient being allowed there. A sick-room is no place for visitors and otherwise curious persons. Their presence annoys the child and takes away just so many strength units, which may determine the question of life or death.

The Clothing.—The clothing should be the usual night-clothing. I have long since discarded the oiled-silk jacket or any special means of covering. The oiled-silk jacket or a jacket made of cotton wadding is very easy to put on, but very difficult to take off with safety; further, it has a tendency to elevate the temperature of the patient, it makes him uncomfortable, particularly during convalescence, and prevents the free action of the skin. These objections, with the fact that there is no rational argument for its use, are sufficient to condemn it.

The Bowels.—The patient's bowels should move once or twice daily. There should be a standing order with the nurse or mother for an enema to be given if the bowels do not move once in twenty-four hours. One-half to one grain of calomel in doses of one-sixth of a grain every hour is usually of considerable service. In a case in which there is very high fever I often order the dose repeated every three or four days.

Counter-irritation.—Counter-irritation of the skin is of but little service in lobar pneumonia. Early in the attack, when there is pain, a mustard plaster,—one-third mustard and two-thirds flour,—mixed to a paste, spread on cheese-cloth, and placed over the involved area will give signal relief. It may be repeated at intervals of from four to five hours. This form of counter-irritation is also useful in convalescence in delicate children when the lung clears slowly. The examination of these cases usually reveals feeble breathing and many mucous râles. In such cases two or three applications daily until the lung clears will answer. The application should be kept on until the skin is well reddened. If this does not take place in ten minutes, the mixture of mustard and flour should be made stronger—one-half mustard to one-half flour. In a few cases with delayed resolution, two dry cups daily, applied directly over the involved areas, have been of much service.

The Diet.—See Diet in Illness, page 139.

Antipyretics.—Whether or not antipyretic measures are to be used, and the nature of the antipyretic to be advised, depends upon the case and the family possibilities as to care and nursing. One child will bear a temperature without inconvenience which would seriously compromise the chances of recovery of another, so that the thermometer is not the only guide. The effect of the fever upon the patient must guide us. Some children will be delirious and restless at 103° F. and will need antipyretic treatment. A temperature of 104° F. rarely needs interference. A rise of one degree F. will usually mean an increase of twenty to thirty heart-beats per minute. In lobar pneumonia, I prefer that the temperature should not go above 105° F., even if at the time the child shows but little inconvenience. Such a temperature means an unnecessary increase in the amount of work required of the heart, which instead demands relief in such an emergency.

Cold water, when it can be intelligently applied, is the best means of reducing fever. It may be used either in the form of a sponge-bath or a cool pack. The sponge-bath (page 30) answers in a few cases in which the temperature is readily influenced. It may be repeated at intervals of from two to four hours. As a rule, the cool pack (page 503) will be required, especially if the fever is particularly high. The sponge-bath, while not controlling the fever as well as does the pack, possesses the advantage that the most ignorant can safely use it. It really amounts to nothing more than sponging the entire body with cool water or alcohol and water. The cool pack requires a trained nurse or a very intelligent mother, either of whom should be instructed by the physician as to its use. When properly applied, and when the packs or baths agree, prompt improvement in the immediate symptoms follows their use; the child, previously restless, and perhaps delirious, falls into a quiet sleep. The temperature falls two or three degrees, the pulse becomes slower and fuller, the respiration less frequent, and when properly given, I have never seen a pack or bath do harm to a child. In fact, they are most grateful to the patients, who, when old enough, have asked to have the towel made cooler when it became warm and dry from the heat of the body.

Heart Stimulants.—A child must never be given a heart stimulant simply because he has pneumonia. Heart stimulation is usually employed too early in the attack. When the pulse shows signs of weakness, whether by its rapidity, its irregularity, or its reduced volume, then it is time for stimulants. For a very rapid pulse, *i. e.*, over one hundred and fifty, tincture of strophanthus has answered better in my hands than any other means of stimulation. For a child from six months to one year old, I order one drop every two hours—at least six doses in twenty-four hours; for a child from one to three

years old, one or two drops at intervals of two hours—at least six doses in twenty-four hours; for a child of three years or over, two or three drops at intervals of two hours—at least six doses in twenty-four hours. If the case is a very serious one, the strophanthus may be given every two hours during the entire twenty-four; but, if the conditions permit, it is better to disturb the patient as infrequently as possible during the night.

When the pulse is irregular and intermittent, with reduced volume, then strychnin is the remedy. For a child from six months to a year old, $\frac{1}{300}$ grain is to be given every three hours—six doses in twenty-four hours; from the first to the second year, $\frac{1}{200}$ grain at three-hour intervals—six doses in twenty-four hours; after the second year, $\frac{1}{150}$ grain may be given at intervals of three or four hours—six doses in twenty-four hours. Children who are under strychnin medication should be carefully watched for signs of the physiologic effects of the drug; the first symptoms being an unusual susceptibility to sudden noise and a slight fibrillary twitching of the muscles of the face and the backs of the hands. Instructions should be given, when these symptoms appear, to discontinue the drug until the next visit of the physician. I have repeatedly noticed these signs of the physiologic effects of the administration of strychnin, and they need cause no anxiety; in fact, they are necessary in order to get the full benefit of the drug. However, it is only in the most severe cases that the drug should be pushed to such an extent.

When the circulation of the skin is deficient, with cold extremities and cyanosis, indicated by blueness of the finger-nails and lips, nitroglycerin is indicated. For a child under one year of age, $\frac{1}{300}$ grain may be given at intervals of two or three hours—six doses in twenty-four hours; for a child from one to three years of age, $\frac{1}{200}$ grain at three-hour intervals—six doses in twenty-four hours; after the third year $\frac{1}{150}$ grain at intervals of two or three hours—six doses in twenty-four hours. Nitroglycerin, if given in large doses, produces headache, of which older children will complain, and nurslings will show their discomfort by restlessness and crying.

Digitalis is rarely used as a heart stimulant in young children. It disturbs the stomach and the remedies mentioned above meet the conditions much better. The ammonium preparations are not employed because their administration even for a short period invariably interferes with nutrition by diminishing the digestive capacity.

Camphor and musk, recommended by some, have a very transient stimulating effect, and in my hands have been ineffective.

Alcohol is often prescribed too early in pneumonia in children. Many of my cases of pneumonia pass through an entire attack without one drop of alcohol. Alcohol in any form should be avoided

early in the disease. Later, when the case is doing badly, when the strychnin and strophanthus, alone or in combination, fail, then alcohol may be given, and then it may be a life-saving measure. It is indicated at this time because it sustains the patient when regular food assimilation is impossible, and at the same time it stimulates the heart. Under one year of age I give from eight to thirty drops of brandy, at two-hour intervals; from one to two years of age, fifteen drops to one dram at two-hour intervals; over two years, one to two drams at two-hour intervals. Cases which show profound sepsis will require and consume an enormous quantity of alcohol without showing the slightest intoxicating effect. When resident physician of the New York Infant Asylum, a child fourteen months of age ill with diphtheria was given four ounces of brandy in twenty-four hours without showing signs of stupor or intoxication.

Hypodermic Stimulation.—The use of hypodermic stimulation in children is to be advised only in an emergency, or when the stomach becomes intolerant. If the dietetic means suggested are carried out, and if disturbing drugs such as the ammonium salts, heavy syrups, etc., are omitted, there will rarely be any occasion to resort to hypodermic stimulation. But when indicated the doses suggested for the stomach may be given hypodermically, with the exception of alcohol, which should not thus be given in quantities greater than one-half dram of brandy or whisky at one time.

Gavage.—Cases will be encountered in which, on account of the profound toxemia, no food or medicine will be taken. Here the giving of stimulants and predigested food by means of gavage (page 140) will be of material assistance. The milk used should be completely peptonized, and to it whisky, brandy, and stimulating drugs may be added. The forced feeding should not be used oftener than once in four hours, usually once in six hours is preferable. When thus given the amount of the stimulants should be increased.

Colon flushing (page 518) with a normal salt solution, at 110° F., is of great service in pneumonia when there is extreme prostration. A pint or more of the solution may be used alone or combined with one-half dram of brandy or whisky. The fluid should be carried high up into the descending colon. As the rectum soon becomes intolerant, the flushing should not be repeated oftener than once in six or eight hours.

Specific Medication.—There is no drug known which will cut short or abort an attack of lobar pneumonia. Mercury in the form of large doses of calomel, quinin, salicylate of soda, and other drugs have no specific action. As previously stated, our efforts must be directed toward a conservation of the strength of the patient by placing him in the best position to cope with the disease. This, with careful medication to meet special requirements as they arise,

constitutes our treatment of lobar pneumonia, and has given us a death-rate of only 2 percent in children under two years of age. During convalescence great care is needed as to permitting the child to resume his usual habits of life, for in these matters, as well as in regard to food and exercise, we must make haste slowly.

PRIMARY PLEURISY

Acute primary non-rheumatic pleurisy is a very rare condition in children. I have seen but four cases under nine years of age—one was eight, one seven, and one four years of age, and one only fifteen months old.

Its onset is practically the same as in adults. There is localized pain, the so-called "stitch in the side," the respiration is rapid, forty to sixty to the minute, and shallow; the skin is dry and hot; the cough is teasing, and, on account of the pain which it causes, is partially suppressed by the patient. Fever is present which is usually quite high, 102° to 105° F. The pulse is rapid, one hundred and twenty to one hundred and fifty to the minute. In only one of my cases was the pleuritic inflammation followed by effusion. This was in the child fifteen months old. The fluid in this case was sterile. So far as we could learn there was no rheumatic association in any of the cases.

Treatment.—The treatment which proved successful in the four cases was rest in bed. The patients were given a reduced diet of milk, broths, and gruel. The fever was not of a very persistent character and was readily controlled by sponge-baths (page 30). For the relief of the pain, a flaxseed and mustard poultice,—one part of mustard to nine parts of flaxseed,—applied as hot as could be borne by the back of the nurse's hand, and changed every half hour, gave much relief during the acute stage. After the first twenty-four hours, however, poultices are of little value. Strapping the affected side with strips of Z. O. plaster will give much comfort where the pain continues after the second day. Tincture of aconite in doses of one drop every hour was given to the older children until ten drops had been given. It produced a fairly free diaphoresis and made the patients more comfortable. A grain of calomel in divided doses was given early in the attack, one-tenth of a grain being given every hour. The duration of the acute symptoms was ordinarily from twelve to twenty-four hours; the entire duration of the illness ranging from five days to one week. In the youngest child, with effusion, absorption appeared to be stimulated by the introduction of the needle and the withdrawal of a small amount of fluid, the remainder quickly disappearing afterward. To relieve the cough, small doses of codein, one-tenth of a grain every two hours, were given the older children.

SECONDARY PLEURISY

Pleuritic inflammation, as a complication of disease of the lungs or as a result of disease in other parts of the body, is of very frequent occurrence in the young. Pneumonia furnishes by far the greatest number of cases, lobar more than catarrhal or bronchopneumonia. Tuberculosis is possibly the next most frequent cause of secondary pleurisy, which is almost always without effusion of any moment. If the disease is of considerable duration, adhesions binding the lung to the chest wall will invariably be found at autopsy. Secondary pleurisy may follow pericarditis. Such an occurrence, however, is extremely rare. It has never happened in one of my cases.

Secondary pleurisy may be either what is known as a dry pleurisy or a pleurisy with effusion. When dry pleurisy exists, the pleura has lost its normal luster and is covered early in the attack with a slight fibrinous exudation. As the disease progresses, the exudation may be more extensive, resulting in thick fibrous bands and masses, a network oftentimes being formed in which is enclosed a thick gelatinous material composed largely of pus cells. Repeatedly at autopsy I have found the lung so thoroughly bound to the chest wall that its removal without the aid of force was impossible.

In pleurisy with effusion, a fluid composed either of pus or serum will be found in the pleural cavity. I have never seen a case in which the effusion in a pleurisy secondary to pneumonia did not contain bacteria. The fluid upon withdrawal may appear clear, yet bacteriologic examination will show that it is not sterile. It may be, and often is, the first manifestation of a purulent pleurisy or empyema. In the very young, rheumatic pleurisy (page 485) is extremely rare. I have seen but six cases in children under four years of age.

Treatment.—The treatment of dry secondary pleurisy is usually that of the disease which it complicates. I have never known any special medication to be of any practical value. Tonics and supportive measures generally are of service. Anything that will improve the condition of the patient should be brought into use. A change of residence from the city to the country for those who can afford it, or an outdoor life in the city for those who cannot avail themselves of such a change is always beneficial. Counter-irritation to the chest with mustard or iodin will often give relief to the patient if there is pain, but otherwise it possesses no value. Occasionally there is a sense of "tightness" and constriction of the chest, which amounts to pain, and this condition mustard or iodin will relieve. Painting the affected area with tincture of iodin every second or third night has in a few cases afforded some relief. The administration of iodids as an aid to absorption is of question-

able value and is very apt to disturb digestion. The application of a mustard plaster (page 493), one-third mustard and two-thirds flour, to the bare skin over the diseased area for ten or fifteen minutes, at intervals of six or eight hours, will add to the comfort of the patient. When after recovery from the pneumonia or the empyema adhesions persist, with restricted lung action, active exercise in the open air is to be encouraged. For younger patients horseback-riding, the bicycle, and breathing exercises, with active games in which they become interested and which require deep breathing, do better than anything else. The glass tubes of James, recommended by many, with which the child blows colored water from one bulb to another, have been of no value in my hands, because their use will not be persisted in long enough for benefit. The apparatus is a toy. The child soon tires of it, as of any toy, and its use will be discontinued.

PRIMARY TUBERCULOUS PLEURISY

Primary pleurisy due to tuberculous infection is exceedingly rare in children. I have seen but one such case, and that in a child two years of age. Three ounces of fluid were removed from the chest; in four weeks signs of infiltration appeared in the lung; and in eight weeks after the attack of pleurisy the child died from general tuberculosis. The treatment is the same as for pulmonary tuberculosis.

EMPYEMA

By empyema we understand a collection of pus in the pleural cavity, the pus being the product of an inflammation of the pleura which has become infected with pathogenic organisms. Bacteriologic examination of the pus shows the pneumococcus to be present in pure culture in a large percentage of the cases. The streptococcus and staphylococcus, alone or in combination with the pneumococcus, are seen less frequently. The tubercle bacillus is rarely a factor in empyema of the young. In fifty-one cases I have seen but one in which it was present. Empyema is rarely a primary disease. It is usually secondary to pneumonia, only very rarely to a suppurative process in another part of the body. In all my own cases it followed pneumonia, and if an accurate history were obtainable this would be the record of fully 95 percent of the cases.

The development of the average case of empyema would be very much as follows: The child had catarrhal pneumonia or bronchopneumonia, running the usual course as to fever, respiration, pulse, and prostration, and after a time, from six to twelve days, an improvement in the symptoms was noticed, the pulse and respiration became slower, and the child brighter. For twenty-four hours the temperature range was lower. During the height of the pneu-

monia it was perhaps 104° or 105° F., now it ranges from 100° to 102° F., occasionally dropping to 99° F. Such a temperature continues for a few days, when it is noticed that it is lower in the morning than in the evening, although the evening temperature may not be over 102° F., perhaps occasionally reaching 103° F. The child coughs, the pulse is rapid, 120 to 140, the respirations accelerated, 40 or over. The appetite is poor. These symptoms, with progressive emaciation, may continue for weeks if the condition is not recognized.

The course of development of an empyema after a lobar pneumonia is somewhat different. The crisis occurs and the temperature falls to normal; all goes well for a few days,—four or five, perhaps,—when a slight evening rise occurs. The temperature is lower the next morning, but not quite normal. The following evening it is higher than the preceding and the next evening it is still higher. Such a temperature range is almost pathognomonic of empyema.

Empyema is often mistaken for tuberculosis, malaria, typhoid fever, or unresolved pneumonia. An enumeration of the points necessary for making a differential diagnosis is not within the scope of this work. It may be said, however, that when the physician is in doubt, the aspirating needle should always be used (Fig. 28). If the needle is sterile—and there is no excuse for its being otherwise—and if the skin is properly prepared, there is no danger of infection. The skin should be prepared as follows: A thorough scrubbing with tincture of green soap should be followed by scrubbing with a solution of bichlorid of mercury, 1 : 2000; this, in turn, is followed by washing with alcohol, which is then applied on absorbent cotton and allowed to remain for at least one minute at the site of the proposed puncture. It is well to use a large needle, so that in case the pus is thick it will the more easily pass through it. The child should be held in an upright position, the needle introduced at the site of the greatest dullness. After the withdrawal of the needle, adhesive plaster should be placed over the wound.

Treatment.—The pus being located, operation is the only means of treatment. Aspiration of the pus should not be considered a substitute for *incision*. In a recent case in a young child under two years of age an incision with local anesthesia is all that will be required. In older children, or in a prolonged case in a young child, a resection of the rib is to be advised as furnishing a much freer drainage. Occasionally cases are seen among older children in which, on account of a very severe, persisting pneumonia, it will not be safe to use a general anesthetic. In such cases an incision may be made under cocain—a 4 percent solution being injected into the skin at the site of the proposed incision. Such an operation will relieve the imme-

diate symptoms—the displacement of the heart and the difficult breathing. The *resection of a rib* may safely be undertaken after a week or two, when considerable improvement will have taken place in the general condition. As soon as the cavity is opened, two half-inch drainage-tubes from two to four inches in length joined with a large safety-pin are inserted. Gauze is packed around the tubes and against the skin, and upon this the pin rests. Sterile gauze is placed over the end of the tubes as soon as possible after their introduction, in order to prevent a too free escape of pus. When the pus is allowed gradually to escape, much less shock will be experienced. Over the gauze two or three layers of absorbent cotton are placed, and over this the bandage. The dressing should

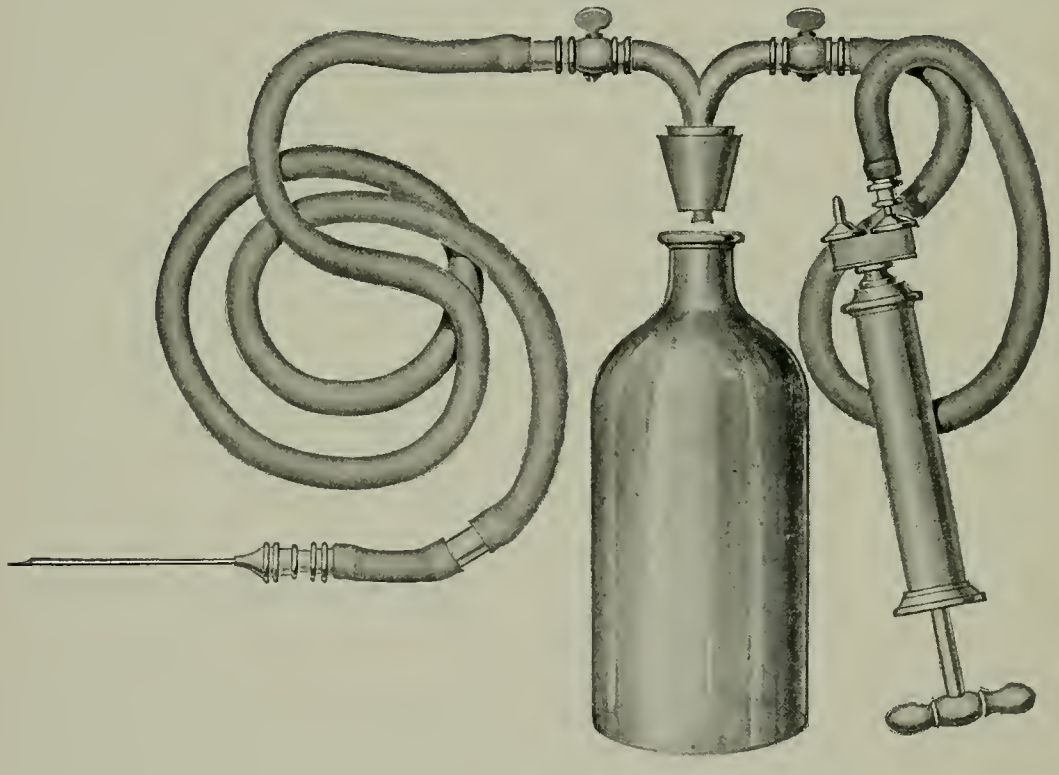


FIG. 28.—POTAIN'S MODIFICATION OF DIEULAFOY'S ASPIRATOR.

be changed every day and the tubes shortened as the lung expands. This expansion will be indicated by the resulting outward displacement of the tubes. After the evacuation of the pus, the pulse usually falls to normal or nearly normal, where it remains. Occasionally, however, cases are seen in which this expected result does not follow the operation.

Illustrative Cases.—In one of my cases the operation was followed by a free discharge of pus, but with no relief whatever to the symptoms. An examination of the chest revealed at the apex of the lung a pocket of pus which had become walled off by adhesions. The case was one of three months' duration when it came under my

care. A second operation removed about six ounces of pus, but the child died from exhaustion about twenty-four hours afterward. Autopsy showed that the pleural cavity was divided into two distinct pus sacs by a firm band of adhesions.

In another case, that of a girl of five years, on account of the reduced condition of the child,—the empyema following a pneumonia,—an incision was made instead of a resection of the rib. The temperature fell to normal and all the symptoms improved for a few days, when an evening rise to 101° F. and over was noted which in two or three days reached 103° F. There was a discharge which saturated the dressings, although they were changed every three or four hours. Our inability to locate an independent pus pocket, the continued fever, and a strong odor to the discharge, suggested the probability of insufficient drainage. In spite of the fever, the child having gained considerably in strength, a second operation was decided upon to enlarge the wound. She was anesthetized and two inches of rib removed, when quantities of necrotic fibrinous material were found in the pleural cavity. These were removed with the finger and dressing forceps, when the temperature immediately fell to normal and the child made a perfect recovery. Irrigation of the cavity had been of no avail.

Ordinarily the tubes should not be removed until from four to six weeks after the operation. They should remain in position until a free respiratory murmur is heard all over the affected side up to the site of operation in the chest wall. When the lung is fully expanded, the tubes will be forced out and found in the dressings. *Irrigation of the pleural cavity* is not to be advised as a routine measure, and with sufficient drainage it will not be necessary. The cases which require irrigation on account of continued fever and insufficient discharge require a resection of the rib. Should a second operation be refused, or be inadvisable, on account of the tender age or the general weakness of the patient or on account of some complication, such as a pericarditis, a daily irrigation with a sterile normal salt solution may be undertaken.

DOUBLE EMPYEMA

Two of the fifty-one cases of empyema which I have seen were bilateral, both pleural sacs being involved. In such cases both sides should not be opened at the same time, on account of the danger of collapse of the lungs. There are usually adhesions present sufficiently strong to prevent this, but we have no means of knowing this beforehand. In both of my cases, the left pleural cavity was opened first, in order to relieve the pressure upon the heart and the great vessels. In one case a considerable quantity of pus was removed from the right side by aspiration, at the time of the operation on the left side. The right side was operated upon four days

later, by which time sufficient adhesions had formed to prevent collapse of the lungs. The patient, a boy of two years, made an excellent recovery.

The second case was one year of age. Pus had been present in both sides for a considerable time. The left side was opened first. The sac on the right side was smaller than that on the left, and was operated on by incision three days later. The child was very much reduced by the protracted illness. In spite of the free daily irrigation of both cavities the typical temperature persisted until death, probably on account of the very extensive suppurating surfaces. The child died from exhaustion twelve days after the second operation.

EMPYEMA NECESSITATIS

Spontaneous rupture of the pleural sac may occur in cases of empyema of considerable duration which are not properly diagnosed, or not operated upon, if diagnosed. Cases of this nature have been reported in which the pus ruptured into the esophagus, into the bronchi, or through the diaphragm into the peritoneal cavity. In two of the cases seen by me spontaneous rupture occurred. In the first, pus ruptured into the bronchi. The patient was a well-nourished boy three years of age. The pus was sacculated over the anterior portion of the left lung. The parents, not particularly intelligent people, objected to the operation, and while it was under consideration by them, two or three days after the diagnosis was made, the pus ruptured into the bronchi and was discharged from the mouth in large quantities during a coughing paroxysm. The child made an uninterrupted recovery. The other case, a boy of two years, came under observation for a soft, fluctuating swelling the size of a small orange, on the right side immediately below the nipple. Exploration with a hypodermic needle showed pus. An incision was made and about three ounces of pus discharged. When the sac was emptied it was found to communicate with the right pleural cavity by an opening between the seventh and eighth rib. The wound was dressed and the child recovered without further complications.

PULMONARY TUBERCULOSIS

Pulmonary tuberculosis in young children under the fifth year of age rarely occurs independent of tuberculosis elsewhere. At this early period of life the disease is usually acute and fatal. After the fifth year, particularly after the seventh or eighth year, the disease assumes the characteristics which mark its presence in the adult. Even at this age it is by no means of frequent occurrence.

As with the adult, so with the child, the earlier the disease is recognized and the earlier the treatment is begun, the better will be the

result. The advantage offered by the ophthalmic and the von Pirquet reaction is most apparent in this connection. The discovery of tubercle bacilli in the sputum should not be required, before beginning rigid therapeutic measures. Loss in weight, cough, and the characteristic, localized, auscultation signs, however slight, are sufficient to warrant active treatment. Given, for example, an apex involvement in a child from eight to ten years of age, with the advantages which will be mentioned, and the prognosis is better than in adults with equal pulmonary involvement, who have equal advantages.

Treatment.—*Climate.*—For those who are so situated financially as to have the advantages of an equable climate, a change of residence or sanitarium treatment should be provided. A dry climate of equable temperature that will allow the tuberculous child to spend the greatest number of hours in the open air is the best climate for the patient. The climate of southern New Mexico and Arizona is best for these cases. I have had children do well in the Adirondacks and in Sullivan County, New York, but the severity of the winter makes these localities less desirable.

Diet.—Equally, if not more important than climate, is the nutrition of the patient. This must be raised to the highest possible standard, but there should be no overfeeding—a procedure of no value in any disease in the young. My patients have improved most on a high-proteid diet of milk, meat, and eggs, and a high-proteid cereal, such as oatmeal, and the legumes,—dried peas, beans, and lentils,—which are given in the form of a purée. I have found it advisable not to insist that a definite amount of food shall be given in twenty-four hours, but the mother or nurse is told that these foods, prepared in different ways so that the child will not tire of them, are to form a considerable part of the diet. Green vegetables, fruits, and plain desserts are given to furnish variety and to stimulate the appetite. When three meals a day are given, with, perhaps, a glass of milk in the middle of the afternoon, I have been able to maintain better nutrition than with more frequent feedings. Forced feeding in children often defeats its own purpose by producing disgust for or intolerance of food. The child should be fed on nutritious food, for which an appetite must be developed; for, inasmuch as recovery is dependent largely upon nutrition, the question of appetite and food capacity is of paramount importance. Candy, sweet crackers, and other harmful articles should not be allowed. In order to satisfy the candy craving, a small quantity of sweet chocolate may be given after the noonday meal. The best appetizers that we can furnish the child are reasonable exercise, entertainment and play that does not fatigue, and fresh air in abundance, and upon our ability to supply these requirements depends, to a large degree, the outcome of the case.

Tenement Cases.—The majority of the cases of pulmonary tuberculosis in children cannot be sent to sanitariums or to health resorts. They must be treated in their homes. This I have done successfully in New York city even among the tenement population. The basic principles of management are a properly directed life, good food, and fresh air. These are the weapons for fighting the enemy, regardless as to whether the residence is among the rich or poor, in town or country. It is, however, among the tenement population that we experience the greatest difficulty. It is not enough to tell these people how the child is to be fed. The feeding as directed entails considerable expense, and the parents may not be able to meet it. After personal investigation, which should be made in every case if it is demonstrated that proper nutrition or suitable clothing are impossible, I explain the situation to some charitably inclined person of means, and have yet to know of an instance where clothing and a small but sufficient weekly food-allowance were not forthcoming. To the best of my knowledge the child himself has always had the benefit of the charity, and I have investigated such cases closely. An allowance of twenty-five cents a day for fresh meat and milk has oftentimes furnished what was required to bring the case to a favorable termination. The uselessness of much of our medical advice to the poor would, on slight reflection or a little investigation, be apparent. The physician should not trust to chance for results, but should act so as to make results. In addition to the diet above outlined, the advantages of an outdoor life, and the means by which fresh air may be obtained all the year round, are fully explained. Any simple direction as to what may appear to be a radical procedure is rarely carried out without a rational explanation of its necessity. During the daytime the child is kept outdoors. In the park or in the streets is better than in the house. Close, tightly sealed, sleeping apartments at night, however, will undo the good of the outdoor life during the day. The mother is told to have the child sleep alone in the largest room of the apartment, and always in a room in which the windows are opened. This is usually possible. A sponge-bath or tub-bath is given the child at bedtime, followed by a brisk rubbing with a towel. If there is much emaciation, an olive-oil or goose-oil inunction follows the salt bath. Sometimes these directions are followed implicitly; at other times they are forgotten. It is astonishing, however, what rapid improvement will follow, when a tuberculous child of the tenements is given the benefit of fresh air, day and night, with suitable food and cleanliness, even though it is in New York city.

Tonics.—Among the more fortunate classes the same treatment is to be carried out. In these, however, we see fewer cases. The usefulness of drugs depends to a large degree upon an increase of food capacity which their use may cause. Either of the prescrip-

tions written below may be alternated with cod-liver oil and malt, each being given for five days. For a child from seven to twelve years of age, the following are useful restoratives and appetizers:

℞. Tincturæ nucis vomicæ.....gtt. lxxij
Saccharinæ.....gr. iss
Aquæ.....qs. ad ℥iv
M. Sig.—One teaspoonful every two hours. (Six doses daily.)

℞. Ferri et quininæ citratis.....gr. xxiv
Vini xerici.....℥iv
M. Sig.—One teaspoonful in water three times a day after meals.

℞. Tincturæ nucis vomicæ.....gtt. lxiv
Extracti ferri pomati.....gr. vj
Quininæ bisulphatis.....℥j
M. ft. capsulæ No. xxx.
Sig.—One after each meal.

If night-sweats are present, from $\frac{1}{200}$ to $\frac{1}{160}$ grain of atropin given at bedtime will often furnish relief. The dangers of infecting others is fully explained to those in charge of the patient, kissing and fondling are forbidden.

Care of the Sputum.—Various devices for collecting the sputum may be obtained in the shops. A cheap and effective way is the use of a Japanese paper handkerchief, which, when used, is at once placed in a paper bag, the bag and its contents being burned at the close of the day.

BRONCHIECTASIS

Bronchiectasis consists of a dilatation of the bronchi, such dilatation being usually sacculated or cylindrical in form and always associated with an interstitial pneumonia. In a child eighteen months of age who died from bronchopneumonia of three months' duration with terminal sepsis, there were several small cylindrical dilatations. One of these with a capacity of six drams was found in the right lung.

Treatment.—The treatment of the condition is the treatment of interstitial pneumonia, and little can be accomplished with the use of drugs except such as will improve the nutrition of the patient. Children with this unfortunate pulmonary disease should take up their permanent residence in a dry climate such as is furnished by Colorado or New Mexico. A visit of a few months or a year is of but little service. I have used the iodids and the bichlorid of mercury for months without any appreciable improvement, in two of these cases that could not be removed from town. The citrate of iron and quinin, one grain in a dram of sherry wine, makes a good appetizer for these cases. It may be given in one-fourth glass of water after meals. Its use can with advantage be alternated with the syrup of the hypophosphites (Gardner), one to three drams being given

daily in one-half glass of water after meals. Cod-liver oil may be used with advantage for ten days out of a month. Its continued use sometimes is contraindicated, as it is apt to interfere with digestion.

In one of the cases above referred to, the iron was given for ten days, hypophosphites for ten days, and the oil for ten days, when the procedure was repeated. The patient continued to look well, gained in weight, and remained under treatment until he took up an occupation and passed from observation. The condition of the lung had remained unchanged, the only active manifestation of the disease being the expectoration of considerable non-tuberculous pus every morning on rising.

The usual outcome of those cases which have not the advantage of climatic influence is fatal. Death usually results from tuberculosis or from a septic process in some other portion of the body.

DISEASES OF THE HEART

PERICARDITIS

Pericarditis other than as a manifestation of rheumatism is to be regarded as secondary to a diseased process in some other portion of the body.

Treatment.—As far as treatment is concerned, cases of pericarditis may be divided into two groups, those of rheumatic origin and those due to the invasion of the known pathogenic organisms. An immense majority of the cases of dry pericarditis and of pericarditis with effusion are of rheumatic origin. The pericarditis usually is associated with endocarditis, or some other evidences of rheumatic infection are present. As a manifestation of rheumatism, pericarditis may precede, be associated with, or follow inflammation of the endocardium. The general and specific drug management of pericarditis is largely the same as for endocarditis (page 305). The ice-bag is used as in endocarditis, but blisters are not applied. They are of very doubtful utility and disturb the child considerably, not only when they are being applied but for days afterward. When pericarditis occurs without marked endocardial involvement, which is rare in the young, prolonged rest in bed is not so essential.

Drugs.—For the excessive rapidity of the heart action which is usually present, the tinctures of strophanthus and aconite are of a great deal of service. For a child three years of age, one-half drop of the tincture of aconite and one drop of the tincture of strophanthus can be given at two-hour intervals, but not to exceed six doses should be given in twenty-four hours. After the third year, one drop of the tincture of aconite and two drops of the tincture of strophanthus may be given at two-hour intervals, six doses in the twenty-four hours. For the extreme restlessness which often exists, codein or paregoric may be given. For a child under two years of age, paregoric is safer. It may be given in doses of from ten to twenty drops and repeated when indicated at intervals of two or three hours. Older children, between the second and sixth years, should be given codein in doses of from one-tenth to one-sixth grain. After the sixth year, one-fourth grain may be given, to be repeated at three-hour intervals only, and not more than three doses given in twenty-four hours. As soon as the diagnosis is made, if the case is of rheumatic origin it is advisable to begin with the salicylate of soda (wintergreen) or aspirin, in order to prevent an effu-

sion into the pericardial sac. For those under three years, fourteen to twenty grains of the salicylate of soda or aspirin should be given daily with twice the amount of the bicarbonate of soda. As the salicylate is liable to cause some gastric disturbance, it should never be given, when the stomach is empty, except in milk or with some other food; four grains of the salicylate is as much as should be given at one time. After the third year, larger doses may be given. At the tenth year, forty grains may be given daily in divided doses, always in solution, observing the same precautions as to giving it after meals. It is impossible and entirely unnecessary in this country to give the large doses of the salicylate which are given abroad.

In delicate children and in those in whom the salicylate is not well tolerated, aspirin may be substituted or the salicylate may be given by the bowel, using fifteen grains at a time, observing the precautions of diluting it with at least four ounces of water and introducing it through a rectal tube which has been inserted at least nine inches. The apparatus shown in Fig. 19 is a convenient means of injecting the solution. It should not be given oftener than twice daily and should immediately follow an irrigation of the large intestine. In the comparatively infrequent cases which occur as complications of the infectious diseases, the salicylate treatment is not to be advised unless there is some suspicion of rheumatism in the case. The other methods suggested are to be carried out, with the hope that the disease may be controlled. It is in this type of case that the ice-bag is particularly serviceable. In the event of the effusion becoming so excessive as to interfere with the heart action, producing orthopnea and cyanosis with feeble, irregular pulse, operation on the pericardium, such as aspiration, incision, and drainage, is to be considered, although in the few operative cases which I have seen I have not been impressed with its great usefulness. On the other hand, I have seen cases, in which there was an excessive accumulation of fluid, recover under less radical measures. When it becomes evident that pus is present in the sac, incision and drainage may be attempted, as the case will surely be fatal if the usual methods are pursued.

ACUTE ENDOCARDITIS

Endocarditis is seen more frequently between the ages of three and ten years than at any other period of childhood. In probably 95 percent of the cases it is of rheumatic origin. It may occur as a complication of diphtheria, scarlet fever, or any other of the infectious diseases. In two of my cases it was associated with a severe grippe infection. When due to rheumatism, there may be other manifestations of the disease, or the endocarditis may be the only active evidence of rheumatism. The patient, on close questioning

as to his personal history, will usually give evidence of a rheumatic tendency in previous attacks of rheumatism, frequent anginas, tonsillitis, chorea, or growing pains, or there may be a family history of rheumatism.

Treatment.—*Rest in Bed.*—Whatever the nature of the infection, and whether mild or severe, one rule—that regarding quiet and rest—must be followed in all. The child must remain in a recumbent position in bed, the bedpan being used to receive the discharges. The heart must be given as little work to do as possible. The use of the arms and the hands should be discouraged, particularly early in the attack, as it is at this time that the greatest damage is done to the heart. Reaching from the bed to the floor or to the table or chairs should be forbidden.

Diet.—The diet should be largely of fluids, administered in comparatively small amounts, at intervals more frequent than in health. The bowels should move once daily. If a laxative is necessary, a saline should be given. A Seidlitz powder or magnesium citrate is usually effective. Distention of the stomach, whether by gas or by food, causes pressure on the heart and increases its labor. It is my custom, in these cases, to give five feedings in twenty-four hours, and not more than eight ounces at a feeding. Four ounces of milk with four ounces of gruel (see formula No. 2) with zwieback or toast, is the usual means of feeding. In order to vary the diet, a weaker gruel, No. 1, flavored with an ounce or two of chicken or mutton broth, may be given, or a gruel of the same strength may be given plain, with sufficient salt to make it palatable. As the case progresses, and the child improves, eggs, bread and butter, stewed fruit, poultry, fish, and plain puddings may be added to the diet. With the freer feeding, the number of meals should be reduced.

The Ice-bag.—A screw-top ice-bag, half filled with chopped ice, is placed over the heart and it should be our object to keep it on continuously. Children frequently become restless and irritable under this constant application of the ice, and in such instances it may be left off occasionally for from one-half hour to one hour.

Drugs.—In endocarditis following diphtheria or the exanthemata, the use of drugs is of little benefit; even the salicylates seem to have no beneficial effect upon these patients. For the excessive rapidity of the heart action which is sometimes noted, the tincture of strophanthus is more effective than any other drug. Two drops may be given at intervals of from three to six hours to children from five to ten years of age. If there is much excitability and restlessness, codein $\frac{1}{3}$ grain, or eight grains of sodium bromid may be given at sufficiently frequent intervals to control the condition. While every case of non-rheumatic endocarditis is serious as regards its possibilities for permanent damage, not every case, by

any means, is of sufficient severity to demand other treatment than the ice-bag, rest, and an easily digested diet. It is often the milder cases that give us the gravest sequelæ, on account of the lack of objective symptoms. For this reason it is difficult to make parents appreciate the gravity of the disease, and the child is given liberties which should never be allowed.

Anti-rheumatic Treatment.—Every case of endocarditis, under my care, which is not directly associated with one of the infectious diseases, is considered and treated as though it were rheumatism, which, as previously mentioned, it almost invariably is. Sodium salicylate and sodium bicarbonate are early brought into use. For a child of from five to ten years of age, from three to five grains of sodium salicylate are given after each feeding, five times daily, with an equal quantity of sodium bicarbonate. The drugs may be given in capsules or in solution. If the sodium salicylate is not well borne by the stomach, aspirin may be given in equal dosage. The salicylate should be given with occasional intermissions of a day or two, until the urgent symptoms, such as fever, rapid heart, and dyspnea have subsided. The dosage should then be varied, ten grains being given daily for five days out of fifteen. A child who has once had rheumatic endocarditis should be kept under close observation and the parents warned as to the possibilities of a second attack.

Illustrative Cases.—In a private case in spite of anti-rheumatic treatment, during the intervals, four distinct attacks have occurred during the past five years. A dispensary patient at the New York Polyclinic had his first attack when four years of age. So prominent was his rheumatic tendency that during the next four years, regardless of active anti-rheumatic treatment and a careful diet in the intervals, he had eight distinct attacks of endocarditis and died from the heart involvement in his eighth year. There were other manifestations of rheumatism in his case, and on both sides the family for several generations had been markedly rheumatic.

Recurrence.—Inasmuch as a recurrence is very probable, the patient should, even while in apparent health, have the benefit of a restricted diet, being allowed red meat but twice a week and a minimum amount of sugar. During five days out of each month, he should receive ten grains of sodium salicylate and ten grains of sodium bicarbonate, daily. This scheme of medication should be continued for at least two years, and much longer if the patient shows any rheumatic tendency, such as pains in the legs or repeated attacks of tonsillitis. As to the length of time during which absolute rest in bed is to be enjoined, every case must be decided for itself. The time in bed for my primary cases is from six weeks to three months. In one case, that of a boy who had had a very severe second attack, walking was not allowed for six months, the patient using a wheel-chair instead.

The rapidity of the heart's action is the best means of deciding

when the patient shall be allowed to walk. In a case of moderate severity, the heart's action, which has been rapid, 140 to 160, gradually becomes less frequent. The temperature, perhaps, continued for only a week or ten days.

Convalescence.—When the pulse-beat is reduced to 100, which is not to be expected earlier than from the fourth to the sixth week, the patient is allowed to sit in a reclining chair. Previous to this, while in bed, he is gradually accustomed to an elevation of the head by the addition of an extra pillow for an hour or more daily. The patient is allowed greater freedom when it is found that he can be indulged in it, and the heart kept below the 100 mark. The above scheme of management may seem unnecessarily severe, but we must remember the importance of the heart in the economy, and see to it that if the patient cannot have a perfectly sound heart, it shall be damaged as little as possible. It thus becomes a question of observing every precaution that will tend toward the best possible outcome, no matter how drastic such requirements may be.

MALIGNANT ENDOCARDITIS

Malignant or septic endocarditis is rare in children. I have seen but three proved cases. One occurred with scarlet fever, one with diphtheria, and one followed what had apparently been a tonsillitis. In this there was an irregular intermittent type of temperature with gradually increasing prostration and emaciation. In one the temperature frequently reached 105° F. A systolic murmur was present in two cases, apparently from the onset; in the other it appeared three days before death, and until this sign developed, a diagnosis was not made. The cases were all fatal. I know of no treatment that is of value other than in meeting the symptoms as they arise, with hypodermatic stimulation, suitable nutrition, and antipyretic measures applied to the skin in the form of cool packs with rest in the recumbent position.

MYOCARDITIS

Myocarditis of a mild degree is probably of much more frequent occurrence than is ordinarily supposed. It may be associated with inflammatory conditions of the endocardium or pericardium. It is not here, however, that it necessarily occurs in its most severe form. The myocardium is most apt to become involved as a result of bacterial invasion of the heart muscle in cases of grave systemic toxemia, particularly after scarlet fever, diphtheria, or pneumonia.

Doubtless not a few of the cases which show marked irregularity of the heart action,with attacks of syncope and cyanosis following or associated with the above diseases, are due to a myocarditis. Oftentimes the condition is thought to be a neuritis. Auscultation aids us

very little in the diagnosis. There usually will be a weakened first sound, but this may occur without degenerative changes in the heart muscle. Persistent irregularity, with or without a tendency to rapidity, during the early convalescence after the acute disease has subsided, is one of the first indications of the presence of myocarditis. It is often most difficult to judge accurately of the heart action of a child when he is awake, because of the excitement and the resistance which the physician's presence may occasion. Cases in which myocarditis is suspected should be examined during sleep, as to the rapidity and regularity of the heart. The trained nurse's report as regards matters of this nature is not always to be taken as clinical evidence. Persistent irregularity of the pulse, as before stated, is the earliest sign of this very grave disease, and when pronounced and when the irregularity continues during sleep, with cerebral complications excluded, the fact must be appreciated that the child's life is hanging by a slender thread. There are few more harrowing experiences than to have a child, when apparently progressing satisfactorily on the road to recovery after a serious illness, die in an attempt to reach a toy or while assisting in putting on his clothing.

Treatment.—*Rest in Bed.*—When the condition of myocarditis follows even a mild attack of one of the infectious diseases, the invariable rule of absolute heart rest, which I consider the most important feature in the treatment, must be insisted upon. The patient, whether in hospital or in private practice, is not allowed to sit up or even to raise his head from the pillow; a trained nurse is kept constantly with him, so that he may be read to and thus entertained while physical exertion is prevented. The child is permitted to use his arms only, to play with simple light toys, all other exertion being prohibited. Other than the recumbent position, quiet, a daily bowel evacuation, and easily digested food, given in small quantities, little treatment is required. It is important to keep the stomach free from distention with either gas or food. I prefer small quantities of nourishment at frequent intervals to large quantities of food at the usual meal-time.

Drugs.—In more severe cases with cyanosis and dyspnea a hypodermic loaded with strychnin $\frac{1}{50}$ grain and digitalis $\frac{1}{100}$ grain is kept at the bedside constantly. In one of my cases following scarlet fever, so urgent were the symptoms that three physicians were engaged for several days, each being for eight hours daily at the bedside, in addition to the two trained nurses, each of whom was doing twelve hours' duty. My cases have all been given strychnin with the thought of a possible associated involvement of the cardiac ganglion. Further and obviously, certain portions of the heart muscle remain free from the degenerative process and may be favorably influenced by the strychnin. For a child one year of age $\frac{1}{200}$

grain may be given three times daily. From the first to the third year, $\frac{1}{200}$ to $\frac{1}{100}$ grain may be given four times daily. After the third year the dose is subject to considerable variation, the amount depending upon the urgency of the case. Ordinarily from $\frac{1}{75}$ to $\frac{1}{100}$ grain may be given four times a day. If the case is very urgent and the strychnin appears to improve the heart action, it may be given to the point of producing its physiologic effects, such as fibrillary twitching of the muscles of the face and the backs of the hands. Nitroglycerin should not be used. Digitalis is rarely given to young children, as it is very apt to disturb the digestion if long continued; temporarily in older children, it may be used with advantage. A child from five to ten years of age may be given from three to four drops daily well diluted with water and preferably after meals. The tincture of strophanthus may be of more service here than is any other drug. It will be found particularly useful in those cases in which there is a tendency to rapidity of the heart action. A child one year of age may be given one drop every two hours in the twenty-four; from the first to the third year, from one to two drops at two-hour intervals; from the third to the tenth year, from two to four drops may be given at intervals of from two to three hours. The tendency of myocarditis in children is toward recovery. How long each case will require strict observation, and how long the treatment will ultimately need to be continued, must be determined by each individual case. One thing to be remembered, according to my cases, is that the child either dies suddenly or makes a complete recovery, so that as to treatment it is better to err on the side of caution.

Convalescence.—I have found it safe in a very few instances to allow the child to sit up after six weeks. In the very severe case above referred to, it was not safe for the patient to sit up in bed until the end of the third month, and he was not allowed to walk until the end of the fourth month. He was under observation for one year, when he was discharged, and has remained well during the two years which have since elapsed. At the present time there is no evidence whatever of his former illness. A safe rule to follow is to keep the patient in bed, as long as the rapidity and irregularity of the heart exist. When the heart action in the recumbent position is apparently normal, the patient may be allowed to have his head raised by an additional pillow. In this way the head and shoulders are gradually raised day by day, carefully watching the effect upon the heart. Progress is thus made toward sitting up in bed, under careful supervision, until it is demonstrated that it causes no unfavorable influence on the heart muscle. In the same way, standing and walking are gradually begun. Following out this careful method of heart rest and being governed solely by the heart action which indicates the heart power, I have seen apparently hopeless cases re-

cover completely. Whether fibrous changes are present which may have a later influence, there is, of course, no means of knowing.

CHRONIC VALVULAR DISEASE OF THE HEART

The most important feature to keep in mind in connection with valvular disease of the heart in children is the source of the disease. The fact that in a large proportion of the cases it is due to rheumatic endocarditis, and that, when endocarditis has once existed, it is very liable to return, are points not to be forgotten; so that our first step in the management of valvular defects is to discover the cause, and, if it is found to be of rheumatic origin, it should be explained to the parents that other attacks of endocarditis are very liable to occur, unless means are used for their prevention. In the absence, then, of a history of endocarditis in association with pneumonia, diphtheria, or scarlet fever, which in my experience has been of rare occurrence, it is assumed that the valvular lesion is of rheumatic origin, even though there may not be, at the time, positive evidence of rheumatism elsewhere. In not a few of these children with cardiac disease without a history of acute rheumatism, there will be a history of tonsillitis, angina, coryza, asthmatic bronchitis, or chorea—all showing recurrent tendencies. The patients will often be found to have a rheumatic or gouty ancestry, and not infrequently they themselves will be heavy eaters of red meat and sugars.

Treatment.—Our first step, then, in the management is so to regulate the life as to prevent a recurrence of the heart involvement. With this end in view, it is directed that meat be given the child but once every second day, and that sugar be given in great moderation. Poultry, fish, eggs and milk, and high proteid cereals may be given in increased amount in order to maintain nutrition. A tub-bath followed by a dry rub is given daily. The bowels are not allowed to become constipated, and moderate exercise is encouraged.

Drugs Advised.—For five days out of each month, the patient is given, after meals, five grains of salicylate of soda (wintergreen) and ten grains of bicarbonate of soda. This with the low meat and low sugar diet is usually, but not invariably, sufficient to prevent a recurrence. In a boy who has been under my care for several years, and who has had three distinct attacks of endocarditis, I am obliged to give the above treatment for five days with but ten days' intermission. This has been continued for eighteen months, during which time the heart has not been affected. During the past year there has been no tonsillitis, while previously he had had severe attacks every month or two. Both sides of the family are markedly rheumatic.

Drugs Used with Caution.—The further management of valvular disease depends to a certain degree upon the location and nature of the lesion. Right here I would sound a note of warning: Because a child has a cardiac lesion he does not necessarily require digitalis. Not a little harm is done, in the treat-

ment of diseases in children, by giving powerful drugs when they are not indicated. Too often in heart disease the physician feels his duty done when he gives digitalis. Many times I have seen children who, because of some cardiac lesion, were taking digitalis and strychnin, while at the same time they were suffering from constipation, recurrent respiratory disorders, and persistent indigestion due to dietetic errors, all of which had escaped the attention of the physician.

Prognosis.—Under proper management, if begun early, the prognosis in valvular disease in children is good. The heart nutrition and compensation in children are usually most satisfactory. I have several now under my care, in whom grave cardiac disease exists, without any disturbance of any nature whatever which is evident to those who come in contact with the children. In neglected cases the outlook is bad. This is due, first, to the tendency of the endocarditis toward recurrence; and, second, to our neglect to control the activities of the child. The prognosis is better when the insufficiency involves the mitral valves alone. In such cases the activities need be but little curtailed; in fact, the patient is encouraged to indulge in outdoor exercise, but competition in games requiring unusual exertion, tests of speed or endurance of any nature, such as running and racing, are forbidden. When the patient is old enough, swimming, bicycling, horseback-riding, and golf are advised. In boys, when the tobacco and alcohol age arrives they must be told the dangers attending the use of either and both must be forbidden. Girls with mitral insufficiency must be warned against excessive dancing, rope-jumping, tight lacing, and indiscriminate eating. With both, rational exercise is beneficial.

When the aortic valves are involved either in insufficiency or stenosis, or when there is a considerable degree of mitral stenosis, the child's activities should be considerably limited. Under these conditions, with a view to the future, regardless of the existing satisfactory compensation, I forbid the bicycle, swimming, dancing, baseball, or any sport or game which may call for much physical effort. The nature of the disease should be fully explained to the parent and to the patient, when he is old enough to understand it, so as to secure his hearty coöperation, not only as related to his activities, which, of course, is important, but parents should be told particularly that a tonsillitis or an angina is a danger-signal, and that the salicylates are to be brought into use at once, even before the physician is summoned. A diet of plain nutritious food, with nothing between meals, is a very important feature in the treatment of heart disease in children. Ordinarily it is not well to talk over the child's ailments with him or in his presence; in cardiac disease, however, I explain to him as clearly as possible the nature of the illness, and insist that certain measures, particularly such as relate to restriction of activity, shall be carried out indefinitely. I find in this way that better co-

operation on the part of the patient is secured than if he were simply given a list of dogmatic "don'ts." It is my custom, further, in those who show aortic involvement or mitral stenosis, to advise what is known as "heart rest." Every day after the midday meal, with clothing off or loosened, the child is made to rest in a recumbent position for at least one hour. During this time he may sleep or read, as best suits his individual taste.

Medication.—As most of the cases of valvular disease in children are of rheumatic origin, it will be found that the majority of the patients are suffering from anemia, usually in mild degree. All the benefits of nutrition, fresh air, and regularity in living referred to under Tardy Malnutrition (page 164) should be afforded these children. Iron alone or with arsenic is of some value here when given with a suitable diet. A method often followed is to give, for five days, the salicylate and bicarbonate of soda already referred to; for fifteen days iron and arsenic, with the remaining ten days of each month free from medication, unless cod-liver oil is well borne, in which case it is usually given in combination with the extract of malt. Should the patient be of an age when a capsule can be swallowed, the following is given:

℞. Liquoris potassii arsenitis.....gtt. xc
Extracti ferri pomati.....gr. x
Quininæ bisulphatis.....℥j
M. ft. capsulæ No. xxx.
Sig.—Take one after each meal.

If the iron produces constipation, from one-third to one-half grain of the extract of cascara may be added to each capsule.

Heart Stimulants.—Aside from such tonic medication, as far as concerns the heart *per se*, drugs should not be given unless compensation fails. This may take place temporarily, regardless of the nature of the lesion, after some forbidden exercise, or during an acute illness sufficient to produce prostration, and permanently, in those cases which for any reason do badly. In the event of defective compensation and dilatation, the child should be kept in bed until the normal heart action is restored, or until it is demonstrated that the aid of heart stimulants is required. In these cases, particularly in those of the latter type when there is a rapid, irregular pulse, difficult breathing on excitement, and dropsy, the time-honored remedy, digitalis, is to be brought into use. In children I prefer to use the tincture. For a child from five to ten years old, from three to five drops may be given after meals, three or four times daily. The drug, because of its well-known irritant effects upon the stomach, should be given considerably diluted. Its beneficial effects will be noticed first in the relief of the dyspnœa, the pulse becoming regular and of increasing volume, and later in the increased secretion of the kindeys and the disappearance of the edema. The amount of digitalis given should be reduced as soon as the condition of the

patient will allow, but it should be continued for a considerable time after he is up and about. The only contraindication to the use of digitalis in children is its effect upon the stomach. This is often so unfavorable that it causes a loss of appetite, in which case its administration should be discontinued. In this event the tincture of strophanthus, which is referred to repeatedly in this work, as a heart stimulant, may be substituted in the same doses. In case a cardiac stimulant is necessary for a considerable time or permanently, I have had satisfactory results by alternating the digitalis with the strophanthus, giving each for five days. The child, however, who requires constant cardiac stimulation promises but little for the future, and few of my cases have survived the eighteenth year.

CONGENITAL HEART DISEASE

The majority of the cases of congenital heart defects which have come under my observation have died before the second year, usually from some intercurrent disease. Patients who pass this period of life rarely reach the sixth year. When the child becomes active in physical exercise, such as in climbing stairs and in play, dilatation of the right heart results. In two of my cases presenting such a course death took place suddenly in an attack of orthopnea and cyanosis. It may, however, be delayed until the child develops one of the infectious diseases, such as measles or scarlet fever or diphtheria. But little is to be said as to treatment. During the first year or two no treatment is necessary. Later, if the child survives, rest, an easily digested diet, morphin or other sedatives, with cardiac stimulation hypodermically, may give symptomatic relief.

ABUSE OF HEART STIMULANTS

Probably the heart stimulants, such as alcohol, strychnin, digitalis, and strophanthus, are given unadvisedly with greater frequency to children than is any other form of medication. If given needlessly, they are harmful indirectly, in that when the time for their use really arrives, the system having become accustomed to their action, less benefit is derived from them. All forms of cardiac stimulants are of temporary value only. In some patients the stimulant effect of drugs will be exhausted quicker than in others. The common practice of giving heart stimulants, simply because a child has pneumonia, typhoid fever, or diphtheria, is a very bad one. For giving these drugs to the best advantage, there should be one special indication and only one—the evidence of heart weakness. A very rapid heart, above 150 beats to a minute in a sleeping child, may require help, for otherwise it may become exhausted because of the rapidity of its action. Pronounced weakness of the first sound and the accentuation of the second sound call for stimulation. When the heart action is irregular or intermittent, and when cyanosis develops, heart stimulants are called for.

CONTAGIOUS DISEASES

CARE TO BE EXERCISED BY THE PHYSICIAN IN VISITING CONTAGIOUS DISEASES

As a rule, physicians in attendance upon contagious diseases are grossly negligent as to the use of proper precautions against the possibility of themselves becoming mediums of infection. The physician who, without washing his hands, makes a practice of going from a child ill with diphtheria or scarlet fever to patients otherwise afflicted, is an element of great danger in any community. While properly caring for a patient, close contact is necessary, particularly in the treatment of throat and nose cases. Not only his hands, but his clothing as well, may become infected. Therefore, before entering the room in which there is a contagious disease the physician should remove his coat and his cuffs, if detachable, and turn up to the elbows the sleeves of his shirt. If a clean gown is not available, an ordinary clean bed-sheet will answer, this being so adjusted as to protect the clothing, and held in position by two or three safety-pins. My custom, when attending contagious diseases, is to keep in an adjoining room or closet a gown which I wear while in the sick-room.

After leaving the patient the physician should thoroughly wash his hands with hot water and soap, outside the sick-room if possible. An excuse may be offered for not wearing the gown, but there is none for not removing the coat and cuffs, nor for the failure to use the sheet, as suggested; and none for the failure thoroughly to wash the hands after leaving the patient.

QUARANTINE

The isolation of those ill with contagious diseases is an absolute necessity for the protection of others. While it is advisable in cases of scarlet fever to remove from the house children who have not had the disease, and, in the event of diphtheria, all children, regardless of previous attacks, such removal is often impossible. It then becomes our duty to establish such a quarantine as will be effective in preventing the transmission of the disease. In order to do this, the child and the attendant must not come in contact with other members of the family, whether children or adults. If the residence is a city or a country house, one or two rooms on the top floor are selected for the patient, the room from which he was removed being carefully cleaned and disinfected. If the family occupy an apartment, an effective isolation is more difficult, but is by no means impossible.

In such circumstances the room or rooms must be as remote as possible from the other living-rooms. The room in which the child is placed is prepared for the patient according to the instructions laid down on page 43. Not only should the attendant not come in direct contact with other members of the family, but there must be no indirect contact through dishes, feeding utensils, clothing, or bed-linen. The dishes, knives, forks, and spoons should be placed in boiling water and in this way sent to the kitchen. The clothing, towels, and bed-linen should be placed either in boiling water or in a carbolic solution—one ounce to two gallons of water—before sending them to the laundry. Upon their arrival at the laundry they should be boiled at once. A chair outside the door of the sick-room may be used as a receptacle for the various necessities for the patient, which are to be removed only when the person who brought them is at a safe distance.

Two isolating rooms are better than one, and if there can be a connecting bath-room, it is much more agreeable to the occupants. If two rooms are devoted to the patient, one is used for day and the other for night occupancy, the unoccupied room being freely ventilated after the removal of the child. Observing the above precautions until the child is well, I have repeatedly carried through to successful convalescence cases of diphtheria and scarlet fever while other unprotected children have remained in the household during the entire illness without taking the disease.

An incident which well demonstrates the value of proper quarantine occurred at the New York Infant Asylum, Mt. Vernon, New York, during my service as interne in that institution. The institution was built on the cottage plan, two wards in a cottage. A colored child, an occupant of one of the upper wards, was discovered to be ill with scarlet fever. There was an extensive rash, considerable swelling of the cervical glands, and the whole aspect of the case was that of scarlet fever at its height. Through the negligence of an orderly, the child had probably been ill two or three days before our attention was called to him; as a consequence, thirty other children of the ward had been exposed. In order to prevent the spread of the disease to the other four hundred children, it was decided to quarantine the ward with its children and the four attendants. This was done. Twenty-six children and two women attendants developed the disease. The quarantine, on the plan above suggested, was continued for ten weeks. The thirty or more children on the ground floor of the cottage remained there as before, but no other case developed in the institution. In order to prevent the spread of the contagion, there was no personal contact with those outside of the ward, except with the physician who visited them daily, but who always went properly protected (page 314). All clothing and bed-linen were boiled before leaving the ward. The

dishes and feeding utensils likewise were boiled before being sent to the general kitchen.

If such isolation is possible in an institution among the careless and more or less ignorant, it certainly should be equally effective among the intelligent, who are most interested in preventing the spread of disease.

When the quarantine is raised the child should receive a bath of bichlorid of mercury 1 : 3000. If the hair is cut short and shampooed with green soap, followed by the bichlorid, the disinfection is more complete.

DIPHTHERIA

Diphtheria is an infectious, contagious disease due to the Klebs-Loeffler bacillus. Its first manifestation is inflammation, usually of a mucous surface, with the production of a pseudo-membrane. Any of the mucous surfaces may be involved. Thus, under my own observation, the process has involved the nasal cavities, the lips, the mouth, tonsils, pharynx, larynx, trachea, and bronchi. The esophagus was the seat of the pseudo-membrane in one case and the conjunctiva in several. The rectum or the vagina may also be the seat of the disease. Constitutional and other symptoms fairly characteristic rapidly follow the local manifestation. There is always some fever, but the temperature is usually low. Swelling of the glands at the angle of the jaw is an early and important sign if the throat is involved. The breath in many patients with diphtheria has a peculiarly offensive odor which occurs in no other disease. By far the most frequent sites of the local manifestations are the tonsils, the fauces, and the larynx, the nasal cavities being more rarely involved. It is not within the province of this book to go into details as regards differential diagnosis or description of the various phases of the disease. They can be found in any text-book on children's diseases. What is particularly necessary, in the light of modern treatment, is that the physician familiarize himself with the clinical picture of the disease in its various phases, so as to be able to recognize it regardless of where or how it appears.

Antitoxin.—Owing to our increased knowledge of the etiology of diphtheria and since the advent of the specific remedy, antitoxin, the disease has lost much of its former terror. It is still, however, a considerable factor in the death-rate of all large cities. This is due to two causes: first, to parents who fail to appreciate the possible dangers that may arise from a sore throat and who neglect to call a physician early in the illness; second, to physicians who do not believe in diphtheria antitoxin, to those who timidly use it in small doses late in the disease, or to those who wait for positive clinical signs or a report of a culture before using it. Equally as necessary as is the realization of the value of antitoxin,

is the knowledge as to how and when to use it and when to repeat it. In many cases at the beginning of the disease, when the tonsils alone are involved, it is impossible without the aid of the laboratory to differentiate diphtheria from tonsillitis. I have seen case after case in the pre-antitoxin period in which two or three days were required to make a positive clinical diagnosis. In towns in which a bacteriologic examination is possible it is in some instances safe to wait for a report from such an examination. When in doubt, a safer rule to follow, in those cases in which there is pseudo-membrane on the tonsils, is to give antitoxin at once. If the case proves to be a simple tonsillitis no harm will follow. I have given full doses of antitoxin to patients in whom we afterward learned there was no diphtheria, without any unfavorable results.

Illustrative Case.—During the winter of 1906–1907 I was called to see a little girl six years old with a gray membranous patch on the left tonsil, the size of a thumb-nail. There was a temperature of 101° F. The child was complaining of feeling tired and seemed wretched generally. There was considerable difficulty in swallowing. I gave at once 3000 units of antitoxin and sent to a private laboratory a culture from the throat. The report reached me the next morning that the Klebs-Loeffler bacillus was absent. On visiting the case at this time I found that the membrane had extended, the right tonsil being covered. I repeated the antitoxin, giving 3000 units more, and took another culture. This was sent to another private laboratory. Again the report was negative for the Klebs-Loeffler bacillus, but the culture showed a pure growth of the streptococcus. The following morning the throat began to clear, and in two days was normal. Clinically this case was diphtheria. There was no scarlatina, but there was some swelling of the glands at the angle of the jaw. The child showed no symptoms whatever to indicate that antitoxin had been given.

Necessity for Promptness in the Use of Antitoxin.—When there is diphtheria and we wait for positive clinical signs or for the report of a culture, even though but for ten or twelve hours, most valuable time is lost, and it is this delay that is responsible for many deaths. If there is one thing, in addition to its great usefulness, that we have learned as to the administration of antitoxin, it is the necessity of giving it at the earliest possible moment in the disease and of giving it in full doses.

Dosage.—After a large experience in the use of antitoxin I am convinced that it is often given in too small initial doses even by many familiar with its use. In April, 1904, I commenced to use larger doses, rarely giving less than 5000 units at the first injection. When there is membrane on the uvula, the pillars of the fauces, or the posterior pharyngeal wall, or in the nose, we should never wait for the report of a culture, but a full dose of antitoxin should be given at

once. The antitoxin is to be repeated eight or twelve hours later if there is an extension of the membrane or if there is no change in its appearance. If the throat shows a tendency toward improvement, if there is a curling up and loosening of the membrane at the edges, or if it has taken on the granular appearance peculiar to diphtheritic membrane after a full dose of antitoxin, it may be safe to wait twelve hours longer, twenty-four hours in all, before deciding whether a repetition of the original dose or a smaller one is required. A diminution in the nasal discharge in the nasal cases, a lessening of the breath fetor, a reduction in the glandular swelling, and a fall in the temperature—all are indications of improvement, but the physician should not rest there; the constitutional improvement, the clearing-up process, must be rapid and complete, and when the case shows no sign of improvement, more antitoxin should be given.

A child ill with diphtheria must be looked upon as a child poisoned; antitoxin is the antidote, and every case must receive enough of the antidote to neutralize the poison. Whether this will be supplied, depends upon the recentness of the infection when seen by the physician and upon his ability to apply the remedy. In a recent, very severe case, in a girl eight years of age, 16,000 units were required before the disease yielded. The first injection was given on the second day of the disease. In a laryngeal case in a boy five years of age, 9000 units were given in nine hours.

Laryngeal Diphtheria.—If, during the course of an attack of diphtheria or in a case which may have been diagnosed as tonsillitis, the voice becomes hoarse and croupy, it is an almost infallible sign that the process has extended to the larynx, and 7000 units of antitoxin should be given without delay. If, after waiting eight hours, there is no improvement in the laryngeal symptoms, or if they have increased in severity, 5000 more units should be given. Laryngeal cases require larger and more frequently repeated doses than do those in which the fauces alone are involved. Cases of laryngeal diphtheria without previous throat involvement tax our judgment most severely.

Differential Diagnosis.—It is by no means an easy matter to differentiate the croup due to an acute catarrhal laryngitis from that due to membranous laryngitis. The following points have aided me in many instances in forming a right conclusion:

Diphtheritic Croup.	Catarrhal Croup.
Gradual onset.	Obstruction intermittent with gradually increasing severity.
Obstruction persistent.	Sudden onset.
Obstruction both to inspiration and expiration.	Obstruction to inspiration, only.
Little or no response to emesis or inhalations.	Response to emesis and inhalations and to sedatives.
No response to sedatives.	

The mode of onset is, of course, not to be relied upon absolutely

in differentiation. Occasionally the onset of catarrhal laryngitis may be gradual while that of diphtheria is sudden. In the consideration of a great many cases, however, the points of differentiation are of sufficient value to warrant the attention which has been given them. A safe rule to follow, in view of the urgent demand for early injections of antitoxin, is the same as in other forms of diphtheria, *i. e.*, when in doubt, inject from 5000 to 7000 units. From the gradual cessation of the laryngeal symptoms it is fairly safe to assume that the child is doing well, although the breathing may not be entirely free for forty-eight or seventy-two hours after the first injection. In

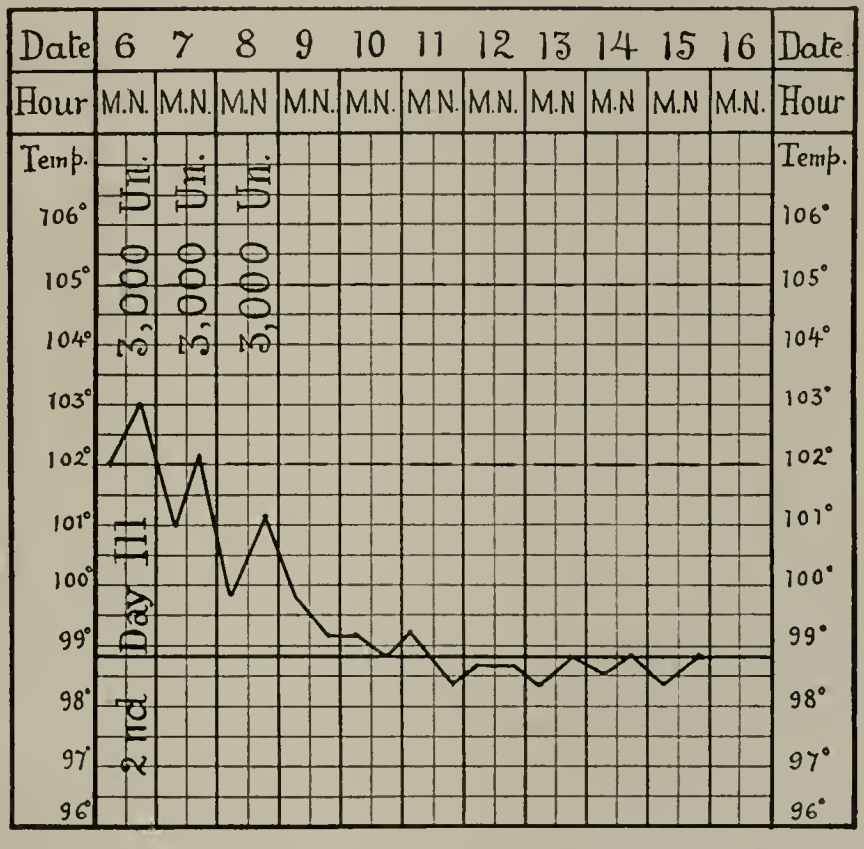


Fig. 29.—Chart Showing the Effect of Antitoxin upon the Temperature in Laryngeal Diphtheria.

cases which require intubation, 7000 to 10,000 units should be given for the first injection and repeated the following day. According to my observation, intubation cases require 10,000 to 15,000 units even when antitoxin is used early, by which we understand on the second or third day of the disease. If this amount or more must ultimately be given, it is advisable to give it early in the disease. The earlier the injection, the less frequent will be the necessity for its repetition.

Illustrative Case.—The chart presented in Fig. 29 well shows the effect of antitoxin upon the disease as represented by the temperature. The case was one of a girl eight years of age, who when I first saw her had been ill for two days with sore throat. At the time the

uvula, the pillars of the fauces, the tonsils, the soft palate, the post-pharyngeal wall, and the nose were involved. Three thousand units were given at once. In a similar case now I would give from 5000 to 7000 units. An improvement in the physical condition of the child and in the local process kept pace with the temperature, both being favorably influenced by the treatment, but it required 9000 units of the antitoxin to counteract the effect of the diphtheritic poison.

Antitoxin in Non-operative Cases.—Eighty-three non-operative cases of diphtheria have been treated by me with antitoxin with doses varying from 1000 to 16,000 units, the former being given in one case only. Among these cases one was fatal—my first and only fatal non-operative case. The patient was given 1000 units on the fourth day of the illness. He died on the eighth day. It is hardly fair to include this case in the antitoxin group, as at that time we did not know how to use antitoxin and therefore were more or less timid, and the serum was not up to its present high order of efficiency. An early and full dosage explains the above most satisfactory results. Twenty-one operative intubation cases were treated with antitoxin, and of these eighteen recovered. One of the fatal cases died on the second day of the illness from a complicating lobar pneumonia. Another was seen in consultation on the fifth day, intubated, and given 3000 units at once. The child was septic at the time and died in twelve hours. The remaining case, also seen in consultation, was intubated and received 3000 units on the fifth day. The antitoxin was repeated twice at twelve-hour intervals. The child died of heart failure forty-eight hours after the first injection. We now know that these children should have received at least 5000, or better 10,000, units at the first injection and the dose repeated at eight-hour intervals.

In fourteen non-operative cases in which the injection was given on the first day of the illness it was necessary in but one case to repeat the antitoxin on the following day. In all of these cases the throats were clear in from thirty-six to seventy-two hours after the first injection. Among twenty-three non-operative cases injected the second day, seven required a second injection on the third day, and in three of these a third injection was given on the following day. Among seven third-day-injection cases, two required three injections and two received two injections.

Late Injections.—Antitoxin should always be given in diphtheria no matter how late in the disease the case may first be seen In one case first seen by me on the sixth day, 11,000 units were given in three injections at eight-hour intervals. The child recovered. In another case, already referred to—the one of laryngeal diphtheria in a boy five years of age, who was first seen on the fifth day—11,000 units were given in nine hours with prompt recovery. I have used the antitoxin as late as the eighth day of the disease

with benefit and recovery, and it is my belief that the patient would not have recovered without it. In order to be signally effective, the serum should be given not later than the third day. The later it is given, the greater the amount required, and the greater the need of repeating the injection. Considerable discredit has been thrown upon the antitoxin treatment by the timid and by those not familiar with its use. We frequently hear of cases of diphtheria dying after the administration of antitoxin, the patient having received but 2000 or 3000 units, and that amount perhaps late in the disease. It would be as irrational to claim that quinin is of no value in malaria, because three or four grains daily make no impression on the disease, as it is to claim that antitoxin is of no value in diphtheria, because two or three thousand units are given without beneficial results, even when administered early in the disease.

Blood Changes Due to Antitoxin.—It has been claimed that antitoxin produces deleterious changes in the blood, affecting particularly the red blood-corpuscles. Bearing on this statement we quote from Ewing's "Pathology of the Blood": "The red cells in the blood show no distinct or uniform effects from the use of antitoxin, although in some subjects there is a moderate reduction lasting a few hours. On the other hand, the use of antitoxin, by limiting the progress of the infection, tends to prevent further disintegration of the blood-cells. Within one-half hour after the injection of antitoxin the leukocytes, particularly the polynuclear form, if previously abundant, show a marked dissemination, and in most cases, although the leukocytosis returns after twenty-four hours, it seldom reaches its previous grade." Ewing noted a reduction of leukocytes after antitoxin in all but two fatal cases, while Schlesinger found it in all of his examinations. A marked leukocytosis is usually present in diphtheria, various writers estimating the number in a cubic millimeter at from 25,000 in an average case, to 50,000 in a severe one.

Urticaria.—In 20 percent of my cases urticaria followed the use of antitoxin. The most severe urticaria occurring under my observation followed an injection of 3000 units. The earliest appearance of the eruption was on the fifth day following the injection; its latest appearance, on the twenty-first day. The urticaria apparently differs in no respect from that due to other causes and the treatment should be the same. Among local applications, a 1 percent solution of carbolic acid, or a lead and opium wash, relieves the itching better than does any other measure. For internal administration, salicylate of soda answers better than any other form of medication. For a child five years old three grains well diluted may be given every two hours until five doses have been taken daily, the treatment being thus repeated every day until the rash disappears.

When a member of a family becomes ill with diphtheria the sug-

gestions in Quarantines (page 314) should be carefully followed out.

Immunization.—In every case of diphtheria other children of the family should be immunized. Never less than 1000 units should be given for this purpose, regardless of the age of the child. Cultures should be taken from the throats of children and adults alike. If the Klebs-Loeffler bacillus is found, the case must be isolated and treated as diphtheria, so far as quarantine is concerned. Two of my cases developed diphtheria after immunizing doses of antitoxin. A child nine months of age was given 3000 units and developed diphtheria four days afterward. The patient recovered after a second injection of 3000 units. A boy four years of age was given 1000 units for immunization. He developed diphtheria in thirty-six hours, which was controlled by the injection of 3000 units. The throat was clear in forty-eight hours after the second injection.

Choice of Antitoxin.—The author has used successfully the antitoxin prepared by Parke, Davis & Co., by H. K. Mulford & Company, and by the Health Department, New York city.

FIG. 30.—"RECORD" ANTITOXIN SYRINGE.

Means of Injection.—There are several antitoxin syringes on the market, any one of which may be used if it will admit of repeated boiling, for in every instance the syringe should be boiled before using. The "Record" antitoxin syringe[1] (Fig. 30) satisfactorily fulfils these requirements. Some of the private producers of antitoxin furnish it in glass bulbs with appliances for injecting it subcutaneously. The advantage possessed by this combination is its convenience and its safety, for as the instrument has to be used but once, the danger of infection by means of a syringe which is used repeatedly is thus avoided.

Site for Injection.—The skin over the abdomen between the umbilicus and the anterior spine of the ilium is doubtless the most convenient site for the injection. The skin is very loosely attached at this point and the serum passes freely under it, requiring very little force and producing no laceration of the tissues, nor does the soreness of the parts interfere with the child's customary position in bed. If the buttocks, favorite sites for the injection with many, are selected, the needle should be inserted well up on the side, so as not to interfere with the child's resting on his back.

[1] The "Record" antitoxin syringe may be obtained of James C. Dougherty, 409 West 59th St., New York.

Before injecting, the skin should be thoroughly scrubbed with green soap and washed with alcohol. Upon the withdrawal of the needle, the skin should again be washed with alcohol and a piece of Z. O. plaster, one inch square, applied over the site of the injection. With these precautions regarding cleanliness there has never been, in my experience, a suggestion of a local infection. Wherever the site of the injection, care should be taken not to plunge the needle into the muscle; draw up the skin between the fingers and insert the needle horizontally.

Remedial Measures Other Than Antitoxin.—Among the many remedies which have been advocated and used from time to time in the treatment of diphtheria, practically none remains in use at the present time. During the pre-antitoxin period I had abundant opportunity, in 103 cases at the New York Infant Asylum, to test the value of drugs, inhalations, vaporizing treatment, local applications, gargles, and sprays. In an article relating to this epidemic of diphtheria which was written by me several years ago, is the following statement: "The death-rate in the institution from diphtheria was large. About 60 percent mortality. In so far as the methods of treatment were concerned all were equally valueless. The mild and some moderately severe cases recovered under good general management. The severe cases died regardless of treatment." In other words, there was no method or scheme of treatment used at that time that was of any signal value. Happily, at the present time, all the old methods are forgotten. We do not need them. Antitoxin is a specific. The use of sprays and gargles and applications are of value as a means of cleanliness only. For this purpose the throat irrigation (page 258) answers better than any other. Forcible irrigation of the nose should not be employed. In such cases the danger of forcing infected material into the eustachian tube with resulting secondary otitis is a real one. In small children, if the breathing is interfered with because of membrane or tenacious secretions in the nose, a few drops of liquid albolene instilled every hour will give as much relief as can be furnished by any other local measure.

Sick-room Régime.—In the management of diphtheria the same sick-room régime should be followed out as in other serious diseases. The temperature of the room should never be above 70° F. and at all seasons of the year there should always be a free communication with the outer air by means of an open window. The child should wear its ordinary night-clothes and the bed-clothes should be of the same weight as those used in health. The nutrition of the patient is most important. As a rule, food is poorly taken because of the pain caused by swallowing. Inasmuch as but a few ounces may be taken at one time, it is well to give the nourishment in as concentrated a form as possible. Milk should be given as the chief article of diet, with the addition of lime-water or bicarbonate of soda. If the taste

of milk is disagreeable to the patient, it may be mixed with equal parts of a thick gruel and well salted. Animal broths possess so little nutriment that it is unwise to use them. The milk, plain or diluted, will often best be taken if given cold or cool, even by children under one year of age. It will usually also be taken from a spoon or cup better than from a bottle, because of the discomfort produced by drawing on the nipple. When sufficient nourishment will not be swallowed, gavage (page 140) may be brought into use, or rectal alimentation (page 145) may aid us temporarily in maintaining nutrition. The temperature is rarely high enough in diphtheria to require the use of any means for its reduction. In case of high fever the sponge-bath (page 502) or cool pack (page 503) will answer the requirements. When the heart action becomes weak, irregular, or intermittent, stimulation will be necessary. For this purpose three drugs are of signal value—strychnin, tincture of strophanthus, and alcohol.

Intubation

To the genius of the late Dr. Joseph O'Dwyer, of New York, is due the credit of perfecting this operation, which will forever stand as a monument to the inestimable service which he rendered to mankind. The O'Dwyer intubation set (Fig. 33) furnishes us with the

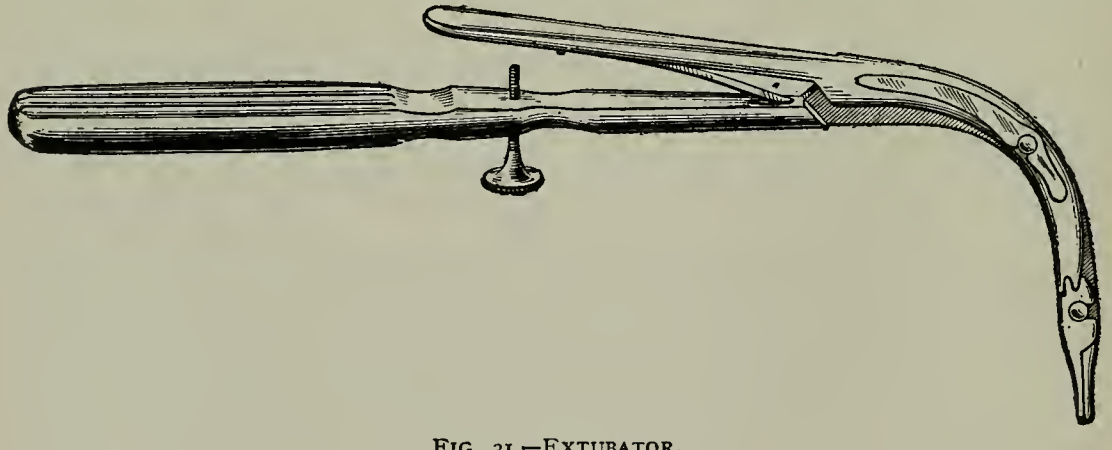


Fig. 31.—Extubator.

necessary instruments for the operation. Various modifications of the tubes, the introductor, and the retractor have been attempted from time to time by others, but the original perfected design of O'Dwyer has yet to be improved upon.

Intubation of the larynx may be required in a retropharyngeal abscess, situated low on the posterior pharyngeal wall. It may be required in edema of the larynx and in acute laryngitis. Its greatest usefulness, however—that for which it was designed—is to relieve the stenosis of laryngeal diphtheria. Before attempting to introduce a tube into the larynx of the living subject the physician should

familiarize himself with the operation on the cadaver. In no other way can the operation safely be learned. Attempts at intubation by the unskilled on the living subject can result only in laceration and other gross injuries to the parts.

When to intubate is a question puzzling alike to students and to

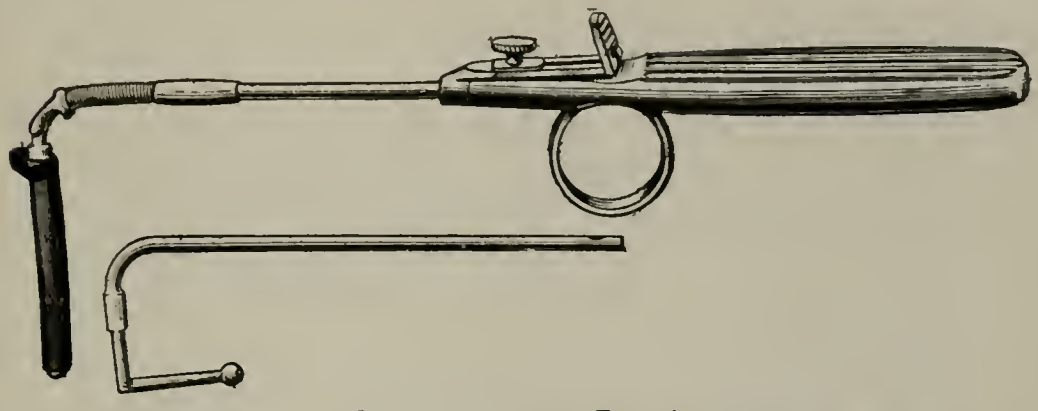


FIG. 32.—INTRODUCTOR WITH TUBE ATTACHED.

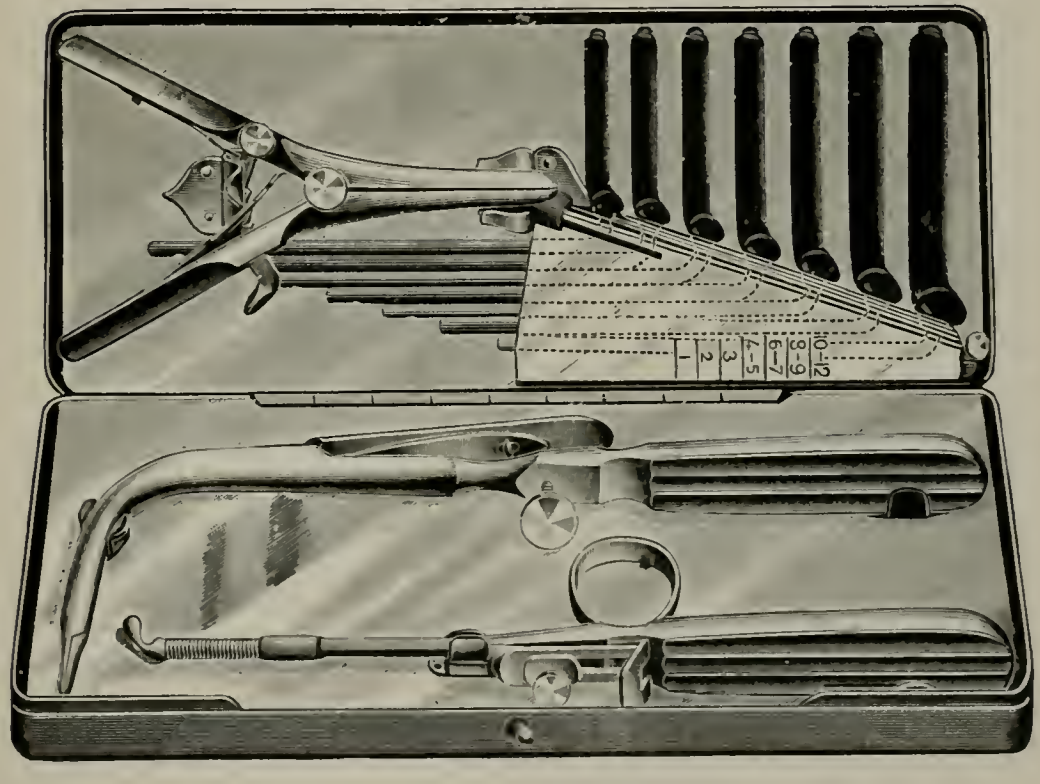


FIG. 33.—O'DWYER INTUBATION SET.

many physicians. It has been variously answered, and many attempts have been made to formulate a series of clinical manifestations the presence of which would render the operation necessary. Thus, it has been said that it is indicated when there is a pronounced recession of the suprasternal and infrasternal regions, and when, as a result of stenosis, air enters the bases of the lungs but feebly or not

at all. It may safely be said that intubation is never done too early, but it is very apt to be done too late—not too late in a great majority of instances to be of some service to the patient, but too late to be of the greatest possible service. My rule regarding intubation in laryngeal diphtheria is to intubate when I see that the child is wasting vitality in his efforts to carry on respiration. Intubation should not be postponed until the child becomes exhausted in his struggle

FIG. 34.—POSITION FOR INTUBATION.

for air. Diphtheria is a disease in which every possible strength-unit must be preserved. Energy wasted in supplying air is an unnecessary waste since O'Dwyer has shown us how to introduce a tube into the larynx.

Operation.—For the operation of intubation, the patient should be wrapped from his shoulders to his feet in a sheet securely pinned from top to bottom. The older and stronger the child, the more this is necessary (Fig. 34). The patient is held on the lap of the nurse, who passes her right hand around the child's body. The child's head rests on the nurse's right shoulder, firmly held in position by

her left hand. In large, strong children it may be necessary for a third person to hold the child's head. The gag being introduced, the operator, with instruments and hands disinfected, holds the introductor in his right hand, locates the glottis with the forefinger of the left, and, using it as a guide, directs the tip of the tube into the larynx. He must be certain that the tip is properly placed before exerting pressure to put the tube into position. This can readily be appreciated by one who has practised on the cadaver. When positive that the tip of the tube is engaged in the glottis, gentle pressure will put it into position. Force should never be used, even when the tube is started right, for the child may require a smaller tube than his age indicates. This is rather unusual, however, as are the cases which require larger tubes than the age calls for. When the tube is easily coughed up, it is my custom to introduce the next larger size. With the tube in position, the obturator is quickly removed. I never trust to pressure on the shank of the introductor to disengage the obturator, but keep the guiding index-finger of the left hand on the expanded head of the tube in order to insure its remaining in position during the extraction of the obturator.

Results of Intubation.—After the operation the child who has previously been struggling will take a deep inspiration and cough. One of the most welcome sounds to the operator is the sharp rattle produced by the passage of air through the mucus which has been forced into the tube. This tells him that the tube is in position and that speedy relief of the stenosis may be expected. The intubated child will usually cough vigorously for several minutes, and in so doing may bring up a quantity of mucus and shreds of membrane. I have often been astonished at the large pieces of membrane and the quantity of thick mucus that can pass through the comparatively small lumen of the tube. In a few cases, the presence of the tube in the larynx has caused such a persistent cough that a sedative was required to control it. Small doses of bromid of soda—four grains every half hour for two or three hours, for a child four years of age—usually answer the purpose. The thread, looped and knotted, which has been attached to the tube, should be long enough to extend four or five inches beyond the lips. In case relief to the stenosis is not immediately perceptible after the operation, or if the breathing is made more difficult, one may be sure either that the tube is not in position or, if in position, that it is plugged with membrane, or that membrane may have become disengaged and is pushed downward ahead of the tube. A tube in the esophagus, where, in my hospital service, I have seen it placed by internes, may exert sufficient pressure upon the posterior portion of the larynx effectually to impede respiration.

Illustrative Cases.—Several years ago I was called to intubate a boy two years of age who was suffering from moderate stenosis due to diphtheria. The tube was easily introduced, but its introduc-

tion was followed by entire cessation of respiration. The tube was immediately extracted by means of the attached thread and was found to be plugged with membrane requiring considerable pressure with a wooden toothpick to dislodge it. The stenosis was somewhat relieved as the result of dilating the parts and a removal of a portion of the membrane, but not sufficiently to furnish permanent relief to the patient. The tube was again introduced, followed by a complete relief of the stenosis.

Displacement of the Membrane.—When membrane is dislodged and pushed ahead of the tube, it will usually be expelled by coughing, after the extraction of the tube. A case of this nature, following the withdrawal of the obturator, occurred in a child six years of age, whose breathing, before difficult, was impossible. The child struggled violently, became much excited, and, with one hand free, knocked the gag from its mouth. In my efforts to extract the tube the string broke, and while introducing the gag in order to use the extractor, the child's struggles and attempts at coughing dislodged both the tube and a large amount of membrane, one piece of which, enclosing the tube, came out as a perfect cast of the larynx and upper trachea. The relief was immediate. Re-intubation was not attempted nor was it necessary later. The child had been given 5000 units of antitoxin twenty-four hours before, which helps explain the dislodgment of the membrane.

Removal of the Tube.—When the patient is progressing satisfactorily, the question arises, How soon may this tube be removed? I rarely remove it before the fourth day after intubation. I find that when it is taken out on the second or third day, for cleansing purposes or otherwise, it is usually necessary to replace it.

Necessity for Intubation.—With the introduction of antitoxin, the necessity for intubation has become less frequent. The free use of antitoxin—5000 to 10,000 units as an initial dose, given with the first sign of obstruction and repeated at eight-hour intervals until two, three, or more doses are given—will further reduce the number of cases requiring intubation, making it a still rarer necessity. I do not feel safe in these cases until 15,000 or 20,000 units have been given. Fortunately, in laryngeal obstruction due to diphtheria, the stenosis is usually of gradually increasing severity, so that by the early use of antitoxin many cases are relieved before the necessity for operation arises.

SCARLET FEVER

Scarlet fever is one of the most dangerous diseases to which children are subject, because of its marked tendency to complications. We never know in a given case, whether mild or severe, what the morrow may bring forth. For this reason the most scrupulous care is absolutely necessary in the dietetic and sick-room management. The patient must be kept in bed throughout the entire illness, of from four to six weeks; *i. e.*, from the onset, first manifested by sore

throat and fever, until the desquamation is completed (see Quarantine, page 314). We must realize at the outset the possibilities as to the virulence of the infection and the complications. The death-rate in scarlet fever epidemics varies from 10 to 30 percent. In greater New York from 350 to 450 children under ten years of age die from scarlet fever or its complications every year. In order to do our full duty to the patient, we must place him in the best possible position for successfully combating the disease.

The Sick-room.—The sick-room should be as large as it is possible for the family to supply. It is desirable that it be well lighted by two windows which will make free ventilation possible. For the latter purpose, the window-board (page 44) answers well. There should always be a direct communication with the open air, except when the child is being bathed or its clothing changed. Light and the free circulation of fresh air are absolutely necessary for the proper management of a severe case of scarlet fever. If possible, two rooms should be used—one for the day, the other for the night. The room which is not occupied should have the window or windows wide open. When nephritis, endocarditis, or otitis develops, it is the result of the scarlet fever poison or associated infection,and not because a window was left open or a few rays of sunlight streamed into the room.

Clothing.—The child requires no extra jacket or wraps. The customary night-gown with the light gauze undershirt and the usual bed-covering is all that is required.

Urine Examinations.—The urine should be examined for albumin every day. It is my practice to have the family get a few test-tubes and a bottle of chemically pure nitric acid. When the busy physician has the daily specimen sent to his office or carries it home himself, it is sometimes forgotten, misplaced, or lost. During convalescence, when the daily visit is not made, the nurse or some intelligent member of the family can be instructed to make the test and report if trouble is discovered. Because of a lack of these precautions, nephritis may easily be overlooked until puffiness about the eyes and edema of the lower extremities are discovered by the attendant after albumin had been present in the urine for several days.

Diet.—In the bottle-fed the food strength should be reduced one-half during the acute febrile stage by the use of boiled water. If the child is getting eight ounces of a milk mixture, four ounces of this mixture should be given with four ounces of water. In older children, the diet is not only considerably restricted during the acute stage, but during the entire course of the disease. During the acute febrile stage diluted milk, gruels, and orange-juice should constitute the diet. For a child from two to four years of age, five ounces of milk with five ounces of barley gruel No. 2 (see formulary, page 129) may be given at four-hour intervals—four to five feedings in twenty-four hours, which make an acceptable diet. Variations may be made in the gruels used. Wheat, rice, and granum may all be brought into

use, made as suggested in the formulary and given with equal parts of milk. It is always well, in the feeding of sick children, to provide for some variety in the food, in order that the child may not tire of it. The juice of one-half an orange may be given twice daily, three hours after the milk and gruel feeding. For the sake of variety in the diet, I occasionally allow a glass of whey or kumyss, or a glass of skimmed milk containing one-half ounce of lime-water. Toasted bread, zwieback, or plain crackers, dry or in diluted milk, may be given occasionally.

The exclusive milk diet in the management of scarlet fever, about which we have all heard and still hear a great deal, has not been as successful in my hands as has the foregoing. My observation has been that the exclusive milk diet is apt to produce constipation, intestinal indigestion, coated tongue, loss of appetite—in fact, the child "grows stale" on the milk, which is to be our dietetic mainstay during the weeks that are to follow. During the post-febrile period, slight additions are made to the diet by the use of farina, hominy, wheatena, and the lighter cereals, prepared as a porridge with a sprinkling of sugar and a little milk. The child's customary diet should not be resumed until four weeks have elapsed from the commencement of the attack. If the case has been a severe one, showing marked systemic infection, six weeks should elapse before the full diet is resumed.

Bowel Evacuation.—There should be one evacuation of the bowels daily. If this does not take place, a soap-water enema should be given. If, on account of the diet and the recumbent position, there is a tendency to constipation, a glass of malted milk—six teaspoonfuls of the malted milk to eight ounces of water—as a part of the evening meal will be of service in relieving the condition. The addition of one teaspoonful of cocoa will be grateful where the taste of malted milk is objectionable.

Laxatives.—As a laxative during the acute febrile stage, citrate of magnesia is very satisfactory. As a rule, children like it. It may be given in doses of from two to four ounces, to children from two to five years of age. In case it is not well taken, from one to two teaspoonfuls of the aromatic cascara may be given.

Specific Medication.—There is no specific medical treatment for scarlet fever. Many of my cases have passed through the entire illness without the use of any other measures than those suggested above.

Serum Treatment.—The value of the serum treatment has been by no means demonstrated, and its use is not advised. The preparation of serum and its use before we know the nature of the scarlet fever poison is, to say the least, premature. The only use of serum therapy, so far as we know at the present time, regardless of the kind employed, is to assist the organism in battling with the disease.

Nursing.—As the course of scarlet fever is distinctly cyclic in character, much can be done in the most severe cases to prevent

complications, and to relieve the patient of his temporary burden. Since one of the most important offices we have to perform is to keep the vital force at the highest possible point, we must do everything in our power to preserve the natural resistance of the patient, and this we have done in no small degree when we have so arranged clothing, diet, fresh air, bowel evacuation, sleep, and quiet, as to insure the child's comfort and well-being. The amount of vitality wasted by an uncomfortable, restless child in twenty-four hours may turn the case from a successful to a fatal issue.

I fully believe in "spoiling" a sick child. If a child is more at ease with the mother, the mother's place is with the child. If the mother's presence disturbs the child, as it does in some instances, she should be kept in the background. If it is apparent that the nurse selected is not to the child's liking, or not adapted to the case, another should be secured. I have been obliged repeatedly to take my best nurses from children gravely ill, because the patients were irritable and unhappy in their presence.

Quiet.—Quiet is most necessary. One person in the sick-room with a child very ill is all that should be allowed. A second person is of no service, and if admitted, good air is vitiated; moreover, it is not to be expected that two persons of the "female persuasion" in the same room will not talk!

Indications of Severity.—The physician who has seen a few cases of scarlet fever can usually judge within the first three days as to the severity of the infection. It is indicated by the character of the rash, the height of the temperature, and to a lesser degree by the severity of the angina. A case which, on the second or third day of the rash, shows a temperature range from 101° to 103° F. means that we have not a very severe infection and that the case probably will be mild.

Control of Fever.—A case in which the fever rises suddenly to 104° or 105° F. with a tendency to remain there, means that we have a severe infection to deal with. I find it a safe rule not to allow the temperature to go much above 104° F. A higher temperature than this necessitates an overworked heart. For the purpose of controlling the temperature, a fifteen-minute sponging every hour with water at 90° F. may be tried.

Packs.—If sponging does not answer, the pack (page 503) should be brought into use. Simply because the child has a rash is no contra-indication to the application of moderate cold to the skin. The pack may be used in scarlet fever just as in pneumonia or typhoid fever. The fear that the disease may "strike in" and kill the patient is one of the many inexplicable ideas of the laity with no foundation in fact. The child is placed in the pack at 95° F. It will rarely be necessary to reduce the temperature of the pack below 80° F. If the case is of the fulminating type with persistent high temperature, it may gradually be reduced to 70° F. In reducing the temperature of the pack, the towel is not to be removed from the patient. He is

turned from side to side and the towel moistened with water at the desired temperature. Time and again I have seen children who were tossing about the bed delirious and sleepless, fall into a quiet sleep when placed in a pack. With a reduction of the temperature, there is a corresponding diminution in the pulse-beats of from twenty to thirty a minute. When we think what a saving this is to the work of the heart, its benefit is most apparent.

Tub-baths.—The full tub-bath at a temperature of 95° F. for ten minutes at the commencement of a case in which there is a great deal of restlessness and irritability, will often act most satisfactorily in quieting the patient. Tub-bathing, however, requires a great deal of handling of the patient, and in the cases in which there is a persistent high temperature, and in those in which it mounts up suddenly after the bath, the pack is by far the more satisfactory.

Oil Inunction.—The itching and burning of the skin in scarlet fever are most distressing. This also is relieved to a considerable degree by the pack. The child's comfort will also be greatly enhanced by an inunction twice daily of cold-cream or liquid albolene. Vaselin or olive oil may be used, but they are much less satisfactory. Vaselin will act as an irritant to some sensitive skins.

During the period of desquamation the oily applications largely prevent a free distribution of the scales, and thus limit the chance of infecting others through the clothing and other objects in the room.

Heart Stimulants.—If, during sleep, the pulse is over 150 a minute with a weakened first sound, a heart stimulant is necessary. For a child one year of age, one drop of tincture of strophanthus at two-hour intervals, or an equal amount of the tincture of digitalis, should be given. On account of its being well borne by the stomach, the tincture of strophanthus is always preferred. Strychnin is a remedy of considerable value as a heart stimulant. When the pulse is soft and the heart action shows a tendency to irregularity, $\frac{1}{200}$ grain may be given every two to four hours to a child from one to three years of age, and $\frac{1}{150}$ grain to a child from three to six years of age, at intervals of from two to four hours. Alcohol should be used only in the septic, asthenic cases when other means of stimulation have failed. In such instances it should be used freely. In a few cases I have used it in very large quantities with striking benefit. Beginning with one-half dram of whisky every two hours, it may be increased gradually until its beneficial effects are noticed on the heart action. It is astonishing how much alcohol may be given, in a profoundly septic case, without the slightest effect, except an improvement in the heart action, and a corresponding improvement in the child's general condition.

Care of Throat and Nose.—The throat and nose demand our attention during the acute stage. For the nose toilet in older children, a solution of menthol and liquid albolene is used by means of an atomizer (Fig. 35) and in the very young by instillation with a

medicine-dropper. A forcible syringing of the nose in a young child is not a safe procedure even in the most skilled hands. Local treatment of the throat depends entirely upon its condition. If the mucous membrane is swollen, edematous, and covered with a glairy mucopurulent secretion, or if there is a pseudo-membrane, or if there is much pain or discomfort upon swallowing, local treatment is required. The child is made to gargle, if old enough, or, what is far better, the throat is irrigated with hot saline solution, at 120° F. This is done as is described on page 250. Force will be required in the very young. In older children, the relief from pain that is experienced by free irrigation is so great that usually the child takes the tube in its mouth gladly for the future irrigations. The use of antiseptic gargles and washes has not seemed to me to possess any

Fig. 35.—The de Vilbiss Oil Atomizer.

value other than that of cleanliness, and free douching accomplishes this in a far more satisfactory manner.

Complications.—*Cervical Adenitis.*—Cervical adenitis is a very frequent complication of scarlet fever, and when suppuration occurs it is a most troublesome one. With the first sign of a swollen gland, apply an ice-bag and keep it constantly applied day and night.

This is a very difficult procedure in many children. When trouble is experienced in using the ice-bag, a cold compress (page 262), with water at 50° or 60° F., and changed every thirty to sixty minutes, will answer almost as well. Several thicknesses of old linen, such as furnished by a table napkin, answers well as a medium for applying the cold. The material used should be cut of sufficient length to extend from ear to ear under the jaw. In order that the moisture be retained, oiled silk or rubber tissue may be placed over the dressing, and over all a thin gauze bandage, which is pinned together on top of the head.

When either of the above is not practicable, apply 30 percent ichthyol in zinc ointment, which is kept bound on the parts, the application being renewed every three hours. Cataplasma kaolini may also be used. It is spread on a piece of linen and applied over the swollen area. It should be renewed at six-hour intervals. Whether the ice-bag, the ichthyol, or the emplastrum kaolini is used, Credé's ointment may be given a trial, ten grains being rubbed into the skin over the swollen gland for fifteen minutes twice daily.

Otitis.—Otitis is a complication in 10 to 30 percent of the cases of scarlet fever. In view of the grave possibilities of mastoid involvement, sinus thrombosis, and jugular bulb infection, the presence of pus in the middle ear should be promptly detected, and the pus evacuated by a free incision of the drum membrane. The presence of middle-ear infection may be suggested by a pain or a sensation of fullness in those old enough to locate it. In infants, restlessness, sleeplessness, or tenderness on manipulation in cleansing the ears may be the only objective signs of the trouble. In the majority of my cases of otitis, none of the above signs of pain and discomfort were present. The ear involvement was suggested because of a continued elevation of temperature which could not otherwise be accounted for. With a persistent elevation of the temperature of unknown origin following scarlet fever, the ears should be examined by an expert in otoscopy. As a routine measure during the fever, the condition of the drum membrane should be noted at least every second day.

As stated above, otitis develops in from 10 to 30 percent of the cases, depending somewhat upon the character of the epidemic, but more upon the age of the patient. The younger the child, the greater the danger of ear involvement. Many cases of deafness which we meet had their origin in an attack of scarlet fever, and are due to somebody's ignorance or neglect. Among 185 cases of scarlatinal otitis, reported by Bezold and quoted by Holt, in 30 there was entire destruction of the membrana tympani; in 59, the perforation comprised two-thirds or more of the membrane; in 13, there were small perforations; in 44, there were granulations or polypi; in 15, there was total loss of hearing on one side, and in 6 of the cases upon both sides; in 77, the hearing distance for low voice was less than twenty feet. May, of New York, has collected statistics of 5613 deaf-mutes, of whom 572 owed their condition to otitis following scarlet fever. When we consider how many cases of permanent ear defects have occurred and do occur every year as a result of carelessness or lack of even an elementary knowledge of aural diagnosis, we do not feel inclined to congratulate the members of the medical profession as to their ability to complete their cases. The bacteriology of scarlatinal otitis is the same as in suppurative otitis developing with or following any other infectious disease, except that there is a greater tendency to severity because of the liability to streptococcus infection. Prompt relief demands prompt recognition of the con-

dition of the drum membrane, with evacuation of the pus and suitable after-treatment. (See Acute Suppurative Otitis, page 442). This will not be possible if the practitioner does not examine the ears or is not sufficiently expert to recognize a diseased condition when he sees it.

Cardiac Involvement.—Heart complications are not particularly frequent in scarlet fever. Nevertheless the heart should be examined daily. In my own observations, they have been present in about 2 per-cent of the cases. The treatment of peri-endo and myocarditis is laid down elsewhere under appropriate headings.

Nephritis.—Early in the cases of severe infection there will often be discovered a transient albuminuria with a few hyaline casts. There may be slight suppression of the urine. In but one of my cases was there complete anuria at this stage of the disease. Within thirty-six hours after the first sign of the disease, the kidneys ceased to act, and the child died on the third day, from the acute diffuse nephritis. The condition of the kidney giving rise to albuminuria is best relieved by attention to the skin function by the use of a bath at a temperature of 105° F. every six or eight hours. The child may remain in the bath for ten minutes, during which time the skin should be vigorously rubbed with the bare hand. The tincture of aconite in doses of one drop, with five drops of sweet spirits of niter every three hours, for a child eighteen months of age, will usually produce a satisfactory skin action.

What is known as scarlatinal nephritis rarely appears before the third week of the disease. I have known cases to occur as late as the sixth week. The management of this complication will be found on page 357.

Arthritis as a complication of scarlet fever is seen in only a few of the cases—about 3 percent. There may be swelling or redness of the parts, or both these symptoms may be absent. Whether the swelling is present or not, the joints are very painful on manipulation. Affected joints should be wrapped in old linen, saturated with a lead and opium solution, and the dressing renewed every six hours. The following lotion has answered well in a few cases:

℞. Mentholis ..... ℥ij
Tincturæ opii ..... ℥iv
Spiriti vini recti ..... q. s. ad ℥vj

Soft linen is moistened with the lotion and wrapped about the parts and covered with oiled silk or rubber tissue. The part affected is then wrapped in flannel or cotton-wool. The lotion may be freshly applied at intervals of from four to six hours. The only objection to its use is the odor of the menthol. Internally, to a child four years of age, aspirin may be given in doses of five grains, with ten grains of the bicarbonate of soda at four-hour intervals, four doses being given in the twenty-four hours and continued until the arthritis is relieved. Salicylate of soda may be used in smaller doses, three to four grains; but, as it may be badly borne by the stomach, aspirin is preferable.

WHOOPING-COUGH—PERTUSSIS

As an infectious disease of importance, pertussis may be classed with diphtheria and scarlet fever. It is probably the cause of more deaths today than is any other infectious disease. It does not kill directly through the means of a specific poison, as do diphtheria and scarlatina; but, on account of its prolonged course and its many complications, it is equally effective as a life-destroyer.

Susceptibility.—That pertussis is one of the most infectious of diseases is well illustrated by the following history: On a bright cold day in December a patient of mine, nine months of age, passed in its carriage on the street a child of about the same age who had pertussis. This child was also in its carriage. My patient took the disease. There was no other possible source of infection. That pertussis may be conveyed through the medium of the clothing of a second person is exceedingly doubtful. Direct exposure seems necessary for infection to take place. The period of infection dates from the beginning of the catarrhal stage, and lasts for two or three weeks from the cessation of the paroxysms. The period of incubation is from seven to fourteen days.

When pertussis breaks out in a school or in an institution for children, it is practically impossible to prevent an epidemic. This is because the disease is infectious during the early catarrhal stage, which lasts from one to two weeks. During this time the only symptom is a cough, and perhaps a slight degree of bronchitis, such as we meet in a common cold.

The previous state of health appears to exert no influence as far as the susceptibility is concerned. The strong and the delicate are alike predisposed to infection. The very young and the adult are less liable to take the disease. From the fourth month to the third year is the most susceptible time of life. Cases have been reported in children one week old. Any other concurrent infectious disease exerts no influence upon the course of the pertussis. It has been claimed that the advent of diphtheria or scarlet fever during an attack of pertussis shortened and modified the course of the pertussis. My experience does not corroborate this statement. Other affections, which may develop during an attack, simply increase the burden to be borne by the patient. The largest number of cases develop during the warmer months, from May to November. This may be accounted for in part by the fact that at this period of the year the infected child comes more frequently in contact with its unprotected neighbor. It tends to disprove, however, that catarrhal affections of the respiratory tract predispose to the disease, as respiratory affections in the young during the warmer months are notably rare. The normal mucous membrane of the healthy offers no greater resistance than does the diseased structure of the ailing. We have, in the early stages of pertussis, not simply a bronchitis, as has been claimed, but a catarrhal process due to a specific infection.

Interesting observations relative to susceptibility to measles and pertussis were made by Biedert. After an absence of sixteen years, both these diseases broke out in a German village about the same time. There were 401 children in the village under fourteen years of age. These children had never been far from home, and not one of them had had either measles or pertussis. Of this number, 344 came down with measles and 366 with pertussis, 340 having both diseases at once.

The susceptibility of these unprotected children to pertussis was, therefore, 95.5 percent; to measles, 85.8 percent. The ages of those who escaped pertussis were as follows: Seven were under five years of age; four between five and ten years; nine between ten and fourteen years.

Complications.—The complications of pertussis are many, and it is through them that the disease is so destructive to life. The mortality of pertussis is generally estimated at from 4 to 6 percent. That it is actually much higher than this is well known to every one who has seen much of the disease. The most fatal complication is, in winter, *bronchopneumonia*, and, in summer, *gastro-enteric disease. Convulsions* are not an infrequent complication and may be fatal. Malnutrition often follows a severe attack in the delicate bottle-fed children, thus paving the way for intercurrent disease. Tuberculosis not infrequently follows a prolonged attack of pertussis. *Blindness*, *deafness*, and *motor disturbances* have all been observed during attacks of pertussis, which resulted in complete recovery. These cases may be explained as follows: During a severe paroxysm the cerebral circulation is greatly disturbed, resulting in a moderate congestion or venous hyperemia, which produces a disturbance of nutrition in certain portions of the brain. With the return to the normal, these symptoms all disappear.

Diagnosis.—The diagnosis of pertussis is most difficult in the early stages, before the whoop or the convulsive nature of the paroxysm develops. Even a spasmodic cough does not always mean that we have a developing pertussis. The cough, if more troublesome at night, favors a diagnosis of pertussis. Further, if we have a pertussis to deal with, the cough grows steadily worse, and resists all the usual methods of treatment, the whoop soon establishing the diagnosis. In rachitic children, and in those in whom the nervous element is prominent, the cough of an ordinary cold is often of a decidedly paroxysmal character, especially when there is an acute or subacute laryngitis. The mild cases are also difficult of diagnosis.

Illustrative Cases.—Recently two patients, aged eight and ten years respectively, went through an attack of pertussis with but two or three severe paroxysmal coughing attacks. Two other cases seen in private practice show also how mild the course may be: The patients, brother and sister, aged six and eight years respectively,

commenced coughing about ten days after exposure. The cough was paroxysmal, with from three to five seizures in twenty-four hours. The boy whooped only three times during the entire course of the disease; the girl never whooped at all. Vomiting never occurred with a paroxysm. Both coughed six weeks. These children had neither adenoids nor bronchitis.

Often the very young and the very delicate do not whoop even during a severe attack. Among the severe cases, convulsions and hemorrhage from the nose, ears, and eyes, were seen from time to time. A very severe seizure in a girl nine months old was followed by small extravasations of blood into the skin of the entire body.

In all cases of severe cough of uncertain origin, the nasopharyngeal vault must always be examined for adenoid growths. This, in young children, can properly be done only by the use of the index-finger.

Pertussis in children under eighteen months of age must ever be regarded in a serious light. Delicate and rachitic children should be carefully guarded against the disease. Bronchopneumonia and gastro-enteric troubles are the most frequent complications among this class of children. The majority of healthy children over eighteen months of age bear an attack without any great inconvenience.

Treatment.—In considering the management of pertussis we are first to remember that the disease is self-limited, that it cannot be cured by treatment, and that, in common with the other infectious diseases, all we can do is to make it as easy as possible for the patient to bear. We cannot shorten the attack, but we can lessen the number and severity of the paroxysms. This is to be accomplished by the use of drugs administered by the mouth. The rubbing of a few drops of Roache's embrocation on the stomach is, of course, valueless. The believers in the theory that the chief seat of trouble is in the nose, have advocated and brought into use the insufflation of various kinds of powders, prominent among which are boric acid, resorcin, and ground coffee. This treatment, as might be expected, is of no service.

During a three years' epidemic of whooping-cough in the Country Branch of the New York Infant Asylum, from sixty to ninety children were constantly in quarantine. New cases developed about as rapidly as the old ones were discharged. During the epidemic children were quarantined who did not have the disease. On the other hand, an early diagnosis was frequently made before the onset of the spasmodic stage, by excluding all possible causative factors, such as pharyngitis, laryngitis, and bronchitis.

The cases as they developed were divided into groups of twenty. They were allowed to cough untreated until the height of the paroxysmal stage was reached. This usually required from ten to fourteen days from the commencement of the cough. Careful record was kept day and night of the number and severity of the paroxysms. When there was no increase either in number or severity for three

days, we believed the height of the paroxysmal stage had been reached, and the drug selected was brought into use. The ages of the cases treated varied from six weeks to twenty-six years. Only three patients had reached adult life. Five-sixths of the patients were under four years of age. One-half were under two years. The duration of the attacks ranged from three to twenty weeks. From six to eight weeks was the usual duration. In several the attacks were so mild that a diagnosis was difficult.

Drugs.—The drug treatment consisted in insufflations, internal administration, and inhalations. The treatment in which drugs did not enter was in the use of the steam spray and fresh air. Resorcin and boric acid combined with bicarbonate of soda were used by means of insufflations in six test institution-cases, and discontinued after three days. The treatment was found impracticable and useless. Inhalations of vapo-cresolene were used in ten other institution-cases. Apparently it had no effect whatever in modifying the disease. In private practice vapo-cresolene has sometimes a decided sedative influence upon the disturbed nervous state of the parents and does not harm the child! It has been used with my permission in many private cases. Medicated steam inhalations, creosote, turpentine, and wine of ipecac were used in many cases with decidedly beneficial results. The cases selected for the inhalations were those of the very young and delicate, with a complicating bronchitis, the steam being used in connection with other treatment. The drugs selected for internal administration were alum, fluidextract of horse-chestnut leaves, dilute nitric acid, hydrochlorate of cocain, bromoform, quinin, the bromids, belladonna, and antipyrin.

The fluidextract of horse-chestnut leaves and dilute nitric acid were each used in twenty test institution-cases. After a trial of five days they proved valueless, or objectionable on account of the vomiting produced, and were then discontinued. Alum appeared to be of some service, but it was badly borne by the stomach. Bromoform was used in sixteen dispensary and in six private patients. In three only did it appear to be of service.

One-tenth grain of hydrochlorate of cocain every four hours for a child two years of age was employed in twenty-three dispensary and in five private cases. It possesses some value in controlling the severity of the paroxysms, but the results were not sufficiently marked to warrant its further use.

Quinin has been used in a large number of cases, in both private and out-patient work. I find that great benefit may be derived from its use if a large amount can be given. Its administration, however, is attended with difficulties. Twelve to twenty grains in twenty-four hours are required for pronounced results in children from two to six years of age. The administration of such a large amount of this well-known drug is not favorably received by many parents. Our inability to make it palatable is a serious drawback at any age,

and almost excludes its use in the very young; furthermore, in the very young and delicate it is apt to derange the stomach and produce vomiting. If given in solution it is best to use the bisulphate in yerberzine (Lilly). In older children, when quinin can be given in sufficient quantities in capsules, the improvement as to the number and severity of the paroxysms is sometimes surprising.

Belladonna was used in sixty test institution-cases. It was begun at the height of the paroxysmal stage. It was administered to the point of physiologic effect for a period of from five to seven days without influencing a single case of whooping-cough in the slightest degree. True, the cases were all severe, but they responded promptly to other means used later. The children were all between three and seven years of age. I have repeatedly seen these children with dilated pupils and the characteristic belladonna blush, grasping a crib or a chair for support during a paroxysm that furnished an ideal clinical picture of the disease.

Equal quantities of the bromids of sodium, ammonium, and potassium were used in sixty test institution-cases. The results, considered from all standpoints, were better than with any of the means of treatment thus far referred to. The severity and duration of the paroxysms were especially influenced, although the number of seizures was practically unchanged. From twelve to sixteen grains in twenty-four hours were given to a child one year of age. When given in syrup of raspberry on a full stomach, or with plenty of water, there is very little disturbance attending its use. For a child two years of age, sixteen to twenty-four grains may be given daily.

Antipyrin was used later in sixty test cases in the institution, as well as in out-patients and in private work. I have given antipyrin, combined with bromid of soda, in over six hundred cases of pertussis. The antipyrin was given under the same conditions as those already referred to, combined with syrup of raspberry.

℞. Antipyrinæ.....gr. xviij
Sodii bromidi .....gr. xxx
Syr. rubi idæi.....℥v
Aquæ .....q. s. ad ℥ij
M. Sig.—One teaspoonful every two hours, six doses in twenty-four hours, for a child fifteen months of age.

Antipyrin is readily taken and easily borne by the stomach—two very desirable requirements in a drug that is to be given to a child for a considerable time. It is not depressing when given with any degree of intelligence—in fact, it is well borne by children when given in good-sized doses, and it controls whooping-cough better than does any other drug I have ever used. Its beneficial effects are as follows: The paroxysms are diminished in number from one-third to one-half without any amelioration of an individual seizure, or the seizures may be less severe without any diminution in their number. In some, both the severity and the number of the paroxysms were favorably influenced. In all the cases the effect of the drug was beneficial.

Antipyrin gave the best results of any drug used alone. The bromids took the second place. We then combined the two and used them in forty institution-cases. We soon learned that the two drugs given together more effectively controlled the disease than when either was given separately. In combination they gave satisfaction in the large number of cases previously referred to. At the out-patient department of the Babies' Hospital we use the drugs combined in the form of a compressed tablet. For a child eight months of age one-half grain of antipyrin with two grains of bromid of soda are given at two-hour intervals—six doses in twenty-four hours; for a child of fifteen months, one grain of antipyrin and two and one-half grains of bromid of soda at two-hour intervals—six doses in twenty-four hours; from the fourth to the eighth year, two grains of antipyrin and five grains of bromid of soda at two-hour intervals—six doses in twenty-four hours.

Codein is used only in the most severe forms of pertussis, when other means fail to relieve the patient. One of the most troublesome features of the disease, in fact, a dangerous feature, is the wakefulness at night caused by repeated attacks of coughing and vomiting. When the child cannot sleep, I give codein independent of the other treatment, whatever it may be. For a patient five years of age, one-sixth grain is given at bedtime and repeated during the night whenever the paroxysms require it. For a child from eight to twelve years of age, one-fifth grain may be given at bedtime and repeated twice if necessary. For a child from two to three years of age, one-tenth grain may be given and repeated not oftener than twice during the night. The drug should not be continued longer than a week or ten days. I have never seen unpleasant effects follow its use.

It will be observed that the drugs of value in whooping-cough are the sedatives. It is well known that by the prolonged use of sedatives their effect is lost. For this reason I have found it wise to use what may be called "interrupted medication." For five days the antipyrin and bromid of soda are given, then stopped, and full doses of quinin are given for five days, when the antipyrin and bromid are resumed. In this way, giving the drugs five days each, we continue with advantage for a month or six weeks. It is rarely necessary to continue the treatment longer than six weeks; usually from three to four weeks is sufficient. Of course, the child will whoop after that time, but the active stage of vomiting and severe paroxysms will be over. If the vomiting can be controlled in an attack of pertussis, and if the patient can obtain sufficient sleep, much has been accomplished. I would emphasize here, what has already been suggested: Do not begin the specific whooping-cough treatment, whether by the administration of quinin, antipyrin, or other remedies, until the spasmodic stage is at its height. If a sedative is given as soon as a diagnosis is made, by the time the disease reaches its height tolerance will have become so established that the drug will have lost not a little of

its sedative action. If medicines must be given during the earliest stage, a placebo may be used. The Infant Asylum patients, upon whom the best of our observations were made, received distilled water colored with compound tincture of cardamom.

Steam inhalation is referred to only to call attention to its value when used in connection with the drug treatment. It has been of great service in the very young, and among those who have complicating bronchitis and bronchopneumonia. I prefer the Arnold steam atomizer (Fig. 36). The nozzle is placed about eight inches from the face, which alone is exposed, the other parts of the body being well protected by a rubber sheet. The inhalations, when taken from fifteen to twenty minutes every two hours, often give a weakly, cyanosed patient marked relief. I have used wine of ipecac, creosote, and turpentine in the water thus vaporized, as mentioned before; but I am not convinced that they offer any advantage over plain steam.

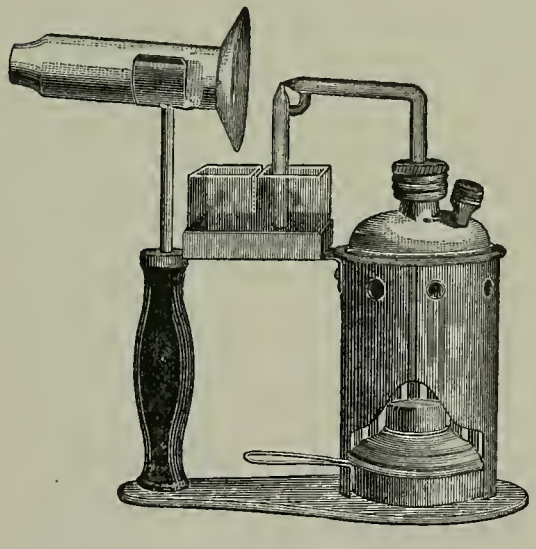


FIG. 36.—THE ARNOLD STEAM ATOMIZER.

Fresh air is of immense value as a means of relief in whooping-cough. We are told that the child rarely coughs when out of doors, but commences as soon as he is brought into the house, which is usually overheated and badly ventilated. In nearly all cases the cough is worse at night. This may be explained in part by the absence of proper ventilation in the sleeping apartment. Many out-patient mothers tell me that remaining for hours with the child near a gas tank relieves the whooping-cough, and it doubtless does. There is a vast difference between the comparatively pure air in the vicinity of the gas tank and the air of the average tenement. I always encourage the gas-tank treatment. A child who for any reason must remain indoors should not be allowed to remain constantly in one room. There should be two rooms, every window in the one not in use being freely open. The living-room and sleeping-room should be kept at a fairly even temperature—from 68° to 70° F.

The Kilmer Belt.—A few years ago Dr. T. W. Kilmer, of New York, conceived the idea that a belt around the child's body producing firm pressure, would support the abdomen sufficiently during a coughing paroxysm to prevent vomiting. The Kilmer belt (Figs. 37 and 38) was the outcome. I have used the belt in a considerable number of cases; at first with a great deal of skepticism, watching the patients upon whom it was used at my clinics at the out-patient department at the Babies' Hospital and at the New York Polyclinic,

where records were kept of the number of vomiting seizures in twenty-four hours, for three days before applying the belt, and the further record after the belt was in use, together with the statement of the mothers and oftentimes of the children themselves. These records convinced me that the belt has a field of usefulness in the management of whooping-cough. I later adopted it for use among my private patients. Like most remedial measures, however, its use is not always attended with success. I have applied the belts without the slightest benefit in some vomiting cases. Usually, however, it is of service in relieving the vomiting. In some the vomiting has entirely ceased after the belt was applied. I believe it should be given a trial in every severe case, particularly where the vomiting is a very prominent symptom, and in infants in whom the drug treatment is unsatisfactory. The belt,[1] which has been improved from time to time, is made of linen, with pieces of rubber elastic at those portions which rest against the sides of the child. There are eyelets in each end for the purpose of lacing the belt together. It is best to apply it over the nethermost garment.

FIG. 37.—THE KILMER BELT.

FIG. 38.—THE KILMER BELT IN POSITION.

[1] The belt is made by J. Jungmann, New York. In taking a measurement the circumference of the abdomen around the most prominent parts should be taken. This with the age of the child should be sent to the manufacturer.

MEASLES

Measles is a disease which few of the human race escape. In itself it cannot be considered a dangerous disease, for when uncomplicated, it is almost never fatal. On account of its tendency to respiratory complications, however, particularly in the young and the feeble, it is indirectly one of the most fatal diseases. During the year 1906, 441 deaths due to measles occurred in Greater New York—58 more than were caused by scarlet fever.

Popular Misconceptions.—Grave errors exist among the laity, and perhaps among a few physicians also, as to the proper management of the more severe exanthematous diseases, and as the measles patients suffer most from this failure properly to appreciate existing conditions, it is not out of place to speak of them here.

The popular conception as to the management of measles is that the patient should be warmly wrapped, given hot drinks, and kept in a dark room with little or no ventilation. An attack of measles renders the child, for the time being, a very susceptible subject for bronchopneumonia. The younger or the more delicate the child, the greater the danger. The dark room with its closed windows and doors and dust, the extra wrappings with the resulting heat "constipation," and the reduced vitality, do much to prepare the way for that which we most dread in an attack of measles, viz., a possible bronchopneumonia; for in measles one danger-signal is up constantly throughout the attack, and it always reads pneumonia.

Complications.—In children's institutions today measles is dreaded more than diphtheria and more than scarlet fever, for the reason that when an epidemic breaks out, because of its marked early contagious characteristics, it means, in all probability, many cases and many deaths. In an epidemic in one of the New York institutions for children, a few years ago, there was a death-rate of 40 percent from measles complicated with bronchopneumonia. Having been through many epidemics of measles in children's institutions, and having seen many cases in private and complicated cases in consultation, I am convinced that in this disease we have an illness which should inspire much greater respect on the part of the physician and demand the highest intelligence on the part of both physician and the family in order that it be managed to the best interest of the patient. Suppurative otitis is a fairly frequent complication; nephritis is a rare one.

Pneumonia is an infectious disease. In measles an inflammation of the mucous membrane of the respiratory tract is a part of the disease. We have thus prepared for us a most favorable soil for the development of pathogenic bacteria that may be inhaled through the mouth or nose. Given a dust-free room, advisedly ventilated, and we would have comparatively few cases of measles-pneumonia.

Treatment.—*General.*—A child ill with measles should be comfortably clad in the usual night-clothes and kept in bed. No extra wraps are required; neither is it desirable to keep the room at a higher temperature than is customary; 68° to 70° F. is a suitable room temperature. There are many gradations of light between glaring sunlight and utter darkness. Both are extreme, and one almost as undesirable as the other. It is my custom to advise that a window-shade of dark green be lowered within one foot of the window-sill. The light brown or drab shade should be lowered completely. If the shade is white or a very light color and not protected by a curtain of dark material, it will be necessary to exclude the bright light by some other means.

The patient should be put on a greatly reduced diet. If bottle-fed, the milk mixture should be diluted at least one-half by adding boiled water, the same quantity being given as in health. In fact, the appetite in the early stage of measles is practically absent, so that little or no food is taken. Patients with measles are given water to drink freely at a temperature not lower than 50° F. For "runabout" children, eighteen months of age and over, the diet as suggested for the sick (see page 139) should be given.

There should be one evacuation of the bowels daily. An enema should be given when this does not otherwise take place. The urine should be examined for albumin every second day.

During the waking hours the eyes should be generously bathed every hour or two with a 3 percent solution of boric acid, using old linen or cotton, which is afterward destroyed.

Symptomatic.—The temperature of uncomplicated measles is rarely high enough to call for special interference. If it should have a tendency to continue above 104° F. for eight or ten hours and the child be uncomfortable and restless, a tepid sponge-bath may be given, the duration of which may be from ten to twenty minutes, and repeated at intervals of two or three hours. Whether the fever demands it or not, the patient should be sponged twice a day with tepid water at 100° F. He is then dried and an application of cold-cream, liquid albolene, or olive oil is made to the entire body. This is given for the sole reason that it relieves the itching, induces sleep, aids digestion, reduces the temperature, and enables the child to pass through the disease with less discomfort.

Now and then a case is encountered in which the rash is slow in appearing. The temperature is high, 104° to 105° F., the skin hot and dry, and the child very uncomfortable, perhaps delirious. In such patients a hot bath, 105° F. to 110° F., of from three to five minutes' duration will often bring out the rash, greatly to the relief of the symptoms, which may have been of an urgent character.

The cough of measles during the active period of the attack is one of the annoying features of the disease, and some relief must be

attempted, particularly if the child is kept awake at night by it. The ordinary expectorants alone are of no service in a measles cough. A sedative only will give relief. For a child six months of age, from five to eight drops of paregoric may be given, and repeated after an interval of two hours, if necessary. The following combination of paregoric and sweet spirits of niter is often of service:

℞. Tincturæ opii camphoratæ.....gtt. x
Spiriti etheris nitrosi.....gtt. iij
M. Sig.—One dose; to be repeated every two or three hours, for a child of eighteen months or older.

From the first to the second year ten to fifteen drops of paregoric may be given at two-hour intervals, if required, or one-half grain of Dover's powder may be used. Usually, it will be necessary to give but two or three doses of the sedative during the night. Should the paregoric or Dover's powder be objectionable because one may dislike to give opium to young children, from three to four grains of sodium bromid in two drams of water, repeated as required every hour or two, will be of service for a child under two years of age. From the second to the fifth year one grain of Dover's powder, or from fifteen to twenty-five drops of paregoric, or $\frac{1}{10}$ to $\frac{1}{6}$ grain of codein, may be given at intervals of from two to four hours.

If bronchitis develops sufficiently to require treatment, as it does in at least one-half the cases, the means for the management of bronchitis suggested on page 271 will be found useful. The temperature of a child ill with measles should be taken three times daily and the lungs and heart should be examined every day. It is my custom to keep the air of the sick-room moistened with vapor during the entire illness. Its benefits are twofold. It relieves the cough, as it is more agreeable to the congested mucous surface during the early stage, and prevents the free circulation of dust, the danger of which has already been referred to. If the room is carpeted, it should be well sprinkled with water before sweeping. It is much better if the floor is bare, as the broom can then be dispensed with and a damp cloth used instead. The length of the quarantine is usually from twelve to sixteen days, at least ten days of this time being spent in bed.

Otoscopic examination should be made every second day until the case is discharged. In the event of a sudden rise in temperature during convalescence, which cannot be explained by the condition of the intestines, lungs, or throat, such an examination should be made by an expert.

CHICKEN-POX—VARICELLA

Chicken-pox is a disease for which very little treatment is required. During the eruptive period and until the stage of vesiculation is passed and crusts have formed, it is well to keep the young child in bed. Older children will find such confinement irksome,

and they may be allowed to be about the room, but should not be allowed to go out of doors. During an attack of chicken-pox the child is more sensitive to exposure, and while complications, such as nephritis, are rare, one of the worst cases of acute nephritis which it has been my lot to treat developed as a sequela of chicken-pox. The itching is the most annoying feature of the disease, as it causes restlessness, loss of sleep, and, through the child's attempts at securing relief by scratching, opens up the possibility of grave skin infections. In out-patient work I have repeatedly seen extensive furunculosis follow an attack of chicken-pox. In two institution-cases erysipelas developed, and in two others dermatitis gangrenosa was a sequela. During the stage of active eruption the child should not be given a tub-bath, gentle sponging with a tepid solution of boric acid—two heaping tablespoonfuls of boric acid to one-half gallon of boiled water—answering the purpose of cleanliness for a few days. After the daily sponging, and several times during the day, the areas affected are anointed with a 10 percent boric acid ointment, made with cold-cream as follows:

℞. Pulveris acidi borici ..... gr. c
Unguenti aquæ rosæ ..... q. s. ad ℥ij

The boric acid ointment relieves the itching to a marked degree and doubtless is of value in preventing local skin infection. An equally effective remedy, but one less agreeable for domestic use, is a lotion composed of 5 percent ichthyol and sterilized olive oil. This is applied to the entire body twice daily after the bath. Objections to its use are the odor and the staining of the clothing and bed-linen. Permanent scars at the site of the vesicles are so rarely seen that no special precautions are required on this account. The duration of the attack, from the beginning of the period of eruption until the crusts fall, is usually about three weeks. The child should be considered in quarantine and not allowed to come in contact with the unprotected, until the skin is clear.

GERMAN MEASLES—RUBELLA

German measles requires ordinarily very little treatment. About two days in bed, a few more days in the house with a reduced diet, and free bowel action, is usually all that is needed, recovery being complete in from six to eight days from the beginning of the attack. The enlargement of the post-cervical glands and the associated pain may be relieved by applications of a 25 percent ichthyol ointment on strips of linen firmly held in position. The emplastrum kaolini may also be used in the same manner with equally beneficial results. Where either is used, the dressing should be changed every six hours.

MUMPS; EPIDEMIC PAROTITIS

Mumps is a contagious disease of the "runabout" age of childhood. The seat of the operation of the infection is the parotid gland. One or both glands may be involved. Often the involvement of one gland is three or four days in advance of the other. The period of incubation is a long one—usually from two to three weeks. The duration of the disease, from the commencement of the swelling until it has completely subsided, is about ten days. It is rarely longer than this when both glands are involved at the same time.

Treatment.—During an attack the child should be kept in bed until the temperature is normal. He should remain in the house until the swelling has entirely subsided. He should be put on a reduced diet of broths, gruels, and milk, as in any illness with fever. Fruits and acids should not be given because of the discomfort they occasion to the patient. The bowels should move once daily. When this does not occur, citrate of magnesia or a Seidlitz powder should be given.

The temperature rarely requires interference. If it reaches 104° F., twenty minutes' sponging with one-fourth alcohol and three-fourths water at 80° F. will usually control it. Relief of the pain and tension, which are most severe in some cases, is best secured by warm wet dressings. A table napkin wrung out of water at a temperature of from 110° to 120° F., and placed over the parts, is a convenient method. The warmth and moisture will be better retained if oiled silk or rubber tissue is placed over the dressing. The application should be changed every twenty or thirty minutes. During the night or at other times when the frequent changing would disturb the patient warm camphorated oil on a piece of flannel which is bound to the parts will usually be agreeable to the patient.

Complications.—Complications in mumps are rare. Orchitis is occasionally seen in boys, and ovaritis in girls, but it rarely occurs if the patient is kept in bed. Infection of the parotid gland, other than that of the specific poison, is extremely rare. I have never seen a case of so-called mixed infection. Nephritis is a rare complication in mumps. I have seen one case of this nature.

Errors in Diagnosis.—Errors in the diagnosis of mumps occur very frequently. A great many cases of acute adenitis are diagnosed as mumps. When getting the history of the previous illnesses in out-patient or private work, we are not infrequently told that the child has had two or three attacks of mumps, which means that he may have had one attack, the other supposed attacks being acute adenitis. It has occurred to me that probably some of these cases which were diagnosed as mumps were due to an infection which had extended to the parotid from the adjacent lymph-glands.

THE URINE

Tables dealing with the frequency of urination and the specific gravity of the urine for the different ages of childhood are necessarily inaccurate, particularly when they refer to children under one year of age.

Urinary Observations.—At the New York Infant Asylum a few years ago, Dr. George T. Myers, at that time resident physician, made a series of investigations under my direction as to the various phases and functions of the newly born infant which differed from some of the observations previously recorded. Among other observations was one as to the time of the first micturition after birth. Forty-five cases cover the series. It was found that the time varied greatly. In fifteen it occurred simultaneously with birth; in ten, in less than four hours; in eight, in from four to eight hours; while the remainder ranged between eight and eighteen hours after birth. In but two cases was it longer than fourteen hours. Without going into detail as to other studies made of the urine in young children, it was found that the specific gravity, the frequency of urination, and the amount of urine passed were subject to wide variations within normal limits. These various features depended upon whether the child was breast-fed or bottle-fed, whether it was a girl or a boy, and whether, if breast-fed, the mother had a scanty or a free flow of milk. The bottle-fed always passed more urine than the breast-fed. The quantity of urine is also influenced by the clothing worn and by the season of the year.

Normal Variations.—Normal variations are therefore necessarily within very wide limits. One child will pass its urine every thirty minutes when awake; others, of equal health and age, will retain it for three hours. Before the child takes much fluid, particularly in the first days of life, from two to five ounces is probably passed in twenty-four hours with a specific gravity of 1.005 to 1.010. Infants urinating very frequently are apt to develop into bed-wetters in later life, probably owing to the undeveloped condition of the bladder, the size of that viscus remaining small. Other than this, very frequent urination with an absence of signs of illness is of no significance in the young. After the feeding is established, the specific gravity will range from 1.003 to 1.012 from the second week to the second year. A baby nine months old will pass an average of about twelve ounces of urine in twenty-four hours. When six years of age, from sixteen to twenty-five ounces will be passed with a specific gravity under 1.015. From this age until puberty both the quantity and specific

gravity gradually increase, the usual range in specific gravity being from 1.010 to 1.020.

Method of Collecting Urine.—The collection of the amount voided in twenty-four hours in children of the "runabout" age is difficult, and in young infants well nigh impossible. For accurate work the specimen should be obtained by the catheter. When for any reason this is not possible, there are various devices for collecting the urine, any one of which may be tried. The tying on of a wide-mouthed bottle or a condom in boys, fastening it with adhesive strips to the body, is often successful. Absorbent cotton into which the child urinates, the urine being expressed from it into a bottle, may be used for either boys or girls, as may also the Chapin collector (Fig. 39). The chief disadvantage of any of these measures is the certainty of contamination. The urine so collected may answer for an examination for albumin, sugar, or the renal elements, but is useless for a bacterial study.

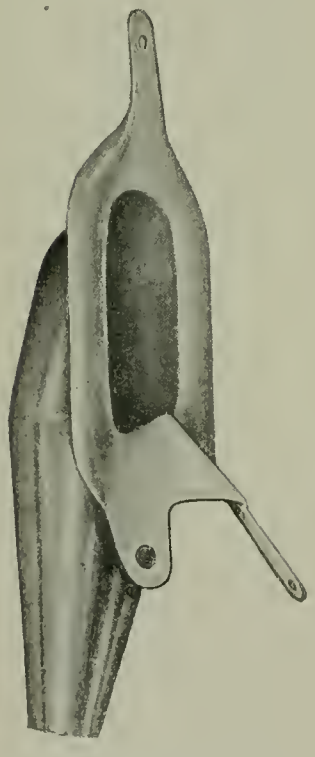


FIG. 39.—CHAPIN URINE COLLECTOR.

From the second to the third year continence at night is usually established. If incontinence continues after the third year, the case should be looked upon as abnormal and receive treatment accordingly. (See Incontinence of Urine, page 352.)

URINARY DISORDERS

Difficult and Painful Urination.—Painful urination is of frequent occurrence in infants and "runabout" children. It may be due to irritation at the urethral outlet following injury or to scalding from acid urine, but more frequently the irritation is due to lack of cleanliness of the parts, which remain moistened, and inflammation results.

In two cases I have found calculi in the urethra. Both were in boys about five years of age. By far the greater number of patients who suffer from difficult micturition are boys, and it is due to phimosis with adhesions and retained smegna. Attention to the external genitals in the matter of cleanliness, the operation of circumcision, or the relief of adhesions by slitting the foreskin and freeing the glans, promptly relieves the condition.

RETENTION AND SUPPRESSION OF URINE

In using the above terms with reference to diseases of the urinary organs it is well to appreciate their significance. By *suppression* is meant a condition of anuria in which no urine is passed into the bladder, that viscus being found empty on catheterization. In *retention*,

the urine is secreted by the kidneys and passed into the bladder but is not voided. When the urine is not voided, we must always ascertain whether there is suppression or retention. If there is retention, it can usually be discovered by palpation and percussion. In fat children a positive diagnosis may be impossible by this means. In any event, when in doubt, a catheter should be employed. For infants under one year of age a soft-rubber catheter, No. 4 or 5 American, should be used. If suppression is diagnosed and treatment by diuretics instituted, when there is simple retention, no little trouble will result, as I have occasionally seen.

Suppression of the urine may persist for hours without any grave pathologic condition of the kidneys. Chilling of the skin surface may be a cause. In acute gastro-intestinal disorders with frequent vomiting and watery stools there may be suppression for twenty-four hours. The secretion is re-established when there is again an available fluid to be added to the circulation from the digestive tract. If the suppression is due to causes of a grave nature, such as acute nephritis, there will usually be signs of trouble other than the suppression, such as vomiting, fever, and edema.

Retention may result from an injury to the urethra, or in girls from vaginitis or in boys from phimosis. Impacted stone in the urethra was a cause in two boys seen by me. Fortunately in each case the stone was located near the meatus and readily removed. The bladder of the infant and young child is very readily infected and care should be exercised to have the catheter sterile before it is used.

Local Treatment of Retention.—The immediate relief of retention is by catheterization. Further treatment consists in the correction of the exciting cause. If a catheter is not at hand, the application of a hot stupe over the lower portion of the abdomen and the genitals may be sufficient to stimulate urination. The use of a soap-sud enema, producing an evacuation of the bowels, is often sufficient to cause an emptying of the bladder at the same time. It is always advisable to attempt relief through the use of the hot stupe or the enema before resorting to catheterization.

Local Treatment of Suppression.—Colon flushing is one of the most effective measures of relieving this very urgent condition. The apparatus required and the methods employed will be found on page 219. If the temperature of the patient is not above 102° F., the normal salt solution, at a temperature of 110° F., is advised. I have always found the flushing more effective when this degree of heat was used. One pint is introduced, for a child three years of age. In children of one year or under, from four to eight ounces is all that will be retained. It must not be repeated, however, oftener than once in six or eight hours, as the colon of a child soon becomes intolerant of the injections and but little will be retained. Repeatedly, after the first injection, the kidneys have resumed activity when all other means have failed. It has been particularly useful in cases following

or accompanying the exanthemata, where there was an acute nephritis with greatly diminished secretion of the urine.

INCONTINENCE OF THE URINE; BED-WETTING; ENURESIS

The involuntary discharge of urine is normal in the young infant. Urination becomes a voluntary function at a later age, the time depending largely upon the child's training. In most children, with the right kind of management, it may be controlled during waking hours by the tenth month. During sleep, it continues to a later period, and while in many cases it may be under perfect control at the completion of the second year, I do not regard the loss of control as abnormal until the third year is completed. If during the second year the child shows a tendency to frequent urination and involuntary passage of urine during waking hours, with habitual incontinence at night, it is my custom to advise preventive measures.

In some of these children the urine is very acid and of a high specific gravity—1.020 or over. In such cases a reduction of the quantity of the highly nitrogenous food-stuffs in the diet, especially meat and eggs, is often followed by improvement—the eggs and red meat being given alternately not oftener than every second day. Where the urine is normal, the quantity of fluids given during the twenty-four hours is reduced from 25 to 50 percent and more solid nourishment substituted.

When the incontinence persists during waking hours at the completion of the second year, or during sleep at the completion of the third year, the condition is regarded as abnormal and the child placed under treatment.

In assuming the care of a child with incontinence our first step is to discover the cause of the trouble. With this object in view the patient is examined with the idea of discovering any peripheral abnormality which may have a bearing on the disorder. Thus the incontinence may be due to a vaginitis or to an adherent clitoris in girls, or to phimosis in boys; it may be due to thread-worms in the rectum, to constipation, to stone in the bladder, to cystitis—a very rare condition, and to hyperacidity of the urine—a very common one. The diet also may play a part. The use of highly nitrogenous food in large amounts, or a diet rich in sugar may lead to changes in the urine sufficient to cause the trouble. The presence of adenoid growths in the nasopharyngeal vault is supposed by some writers to cause enuresis. As a result of the diurnal and nocturnal incontinence, the bladder may never have developed and its capacity may be greatly reduced. Obviously, when such is the case, incontinence will be noted both day and night.

After all possible dietetic and peripheral causes have been eliminated, about 90 percent of the cases remain. These are due to a neurosis, and are not dependent upon any discoverable pathologic condition. There is a lack of development, a weakness of the vesical

sphincter, and a lack of coördination of those portions of the sympathetic nervous system which control micturition.

Treatment.—If due to peripheral causes they must be corrected and the general physical condition of the child improved, although in my experience the delicate and chronically ailing are not the children who are the greatest sufferers. By far the larger number of my patients have been well-nourished children who were otherwise normal. Long-continued incontinence does not appear to affect the general health. When well established, the condition, untreated, usually continues until the child is eight or ten years of age. I have known of a few cases which persisted until puberty.

If no improvement follows the removal of all possible dietetic and peripheral causes, we must assume that we have an idiopathic incontinence to deal with. If the case is of several months' or years' standing, with nightly incontinence, once, twice, or three times, we must acquaint the mother with the fact that prolonged treatment will in all probability be required, and that unless her active and continued coöperation is assured, the treatment of the case will not be undertaken.

Illustrative Cases.—To show how untiring must be our efforts, a recital of an early experience with twelve inveterate bed-wetters may not be without interest. Several years ago, while resident physician at the New York Infant Asylum, twelve patients, nine boys and three girls, ranging in age from six to ten years, were selected for treatment. All were in fair health. No local cause for the enuresis could be discovered in any of them. They had been given the usual treatment with strychnin, belladonna, and other drugs without improvement. They had always been bed-wetters. All wet the bed two or three times during the night, and three suffered from daily incontinence as well. The oldest, a boy of ten, with incontinence by day and night, pronounced incurable, had been returned to us from the West, where he had been sent by The Children's Aid Society.

The patients were put to bed at seven o'clock and wakened at ten, to urinate. The medication suggested below was used. Symptoms of atropin poisoning occurred in three in the form of a typical belladonna blush and excitement. After six weeks of treatment there was slight improvement in four. One or two nights a week would be passed without bed-wetting. At the end of the third month the lapses were but once or twice a week. Seven were practically well at the end of the fifth month, rarely wetting the bed. The treatment was continued two months longer, when the dose was reduced one-half, again continued for two months, and then stopped, and nine months after final discontinuance there had been no return. The remaining five cases, all over six years of age and including all the girls, showed but slight improvement after the fifth month of treatment, the incontinence being of almost nightly occurrence. During

the next three months the improvement was gradual, and at the end of the eighth month incontinence occurred not oftener than twice a week, and during the tenth month it was only occasional. The dose was reduced one-half, and after one year of continuous treatment there was no return of the trouble. The atropin was stopped, and six months later the cure was apparently complete.

These cases need not cause discouragement, as they were inveterates, all over six years old, and the oldest ten. They had always wet the bed and had resisted all previous treatment.

Frequently a treatment of from four to six weeks or even for a shorter time effects a cure. The child receives three meals daily. The breakfast and dinner correspond to the age of the child, but one should emphasize the fact that red meat is to be given but once during the twenty-four hours. The supper, which should not be later than six o'clock, I designate a "dry supper." It may consist of any cereal, such as rice, hominy, farina, or wheatena, served with butter and sugar. If this is not well taken, a small quantity of both sugar and milk may be added. Permissible articles for the evening meals in addition to the above are: ice-cream, milk-toast, blanc-mange, raw fruit, jelly, stewed fruit, bread and butter. Meat, eggs, or heavy foods of any kind should not be given at night. At four o'clock in the afternoon the child is given as much water as he wishes, but no fluids after this time are allowed, other than a little milk on the cereal. The abstinence from all fluids after 4 P. M. will at first be a hardship for some children, and they may be allowed a small quantity—three or four ounces of milk or water—with the evening meal; but this quantity should gradually be diminished until at the end of a week it will not be missed.

The child should be as lightly covered at night as comfort will permit. There is less tendency to incontinence if the child rests on his side or stomach. Sleep in this position should be encouraged. In inveterates, where every possible aid is brought into use, I have used the knotted towel as a means of keeping the child off his back. A knot is tied in the middle of the towel. It is then passed around the child so that the knot will rest on the back. If it is long enough, the ends of the towel may be pinned together over the abdomen like an abdominal binder. When the child attempts to rest on the back the knot causes discomfort and the position is changed. At 10 or 11 o'clock, when the person in charge retires, the child should be taken up to urinate.

Drugs.—Without a strict observation of the above measures, particularly those referring to diet and the abstinence from water after 4 P. M., drugs are of no value, whatever their method of administration. With the above suggestions carried out, we have one remedy which is of great value, and that is belladonna. For convenience of administration I prefer the alkaloid, atropin. To get the full benefit

of the treatment in severe cases it must be pushed till we obtain the physiologic effect, as shown by a slight dilatation of the pupils. Before beginning the treatment it is well to advise mothers that a redness of the skin need cause no alarm, but that when it is noticed they should discontinue the drug until further instructions are given. The atropin is administered as follows: One grain is added to an ounce of water; one ounce of water contains approximately 500 drops, so that one drop of the atropin solution would contain approximately $\frac{1}{500}$ grain of the drug. The mother is given a chart containing the directions for administration, which for a child five years of age are as follows:

1st	day	4 P. M.,	0	drop	7 P. M.,	1	drop
2d	"	"	1	"	"	2	drops
3d	"	"	2	drops	"	2	"
4th	"	"	2	"	"	3	"
5th	"	"	3	"	"	3	"
6th	"	"	3	"	"	4	"
7th	"	"	4	"	"	4	"
8th	"	"	5	"	"	5	"

The child is given one drop daily at 4 and 7 P. M. for every year of its age. Thus, for a child three years old the dosage should not be greater than three drops, twice daily; for a child six years old not over six drops, twice daily, would be given. It may be well, if the case is not under close observation, to make a more gradual increase in the dosage so as to avoid the possibility of unpleasant physiologic effects.

It is never advisable to exceed these doses even in older children, for the reason that they are sufficient to control the enuresis; and the dilated pupils and belladonna blush which follow the increased doses show that such doses are unnecessary.

The tolerance of atropin varies considerably, although children usually bear it very well. Now and then a child is treated who cannot take more than two drops ($\frac{1}{250}$ grain) daily. To one boy eight years of age but $\frac{1}{200}$ grain could be given twice daily. Pronounced benefit, ordinarily, will not be observed during the first week or two of treatment. If the child suffers from incontinence while awake, this will first be cured. The improvement in nocturnal incontinence is more gradual and may be considerably delayed. Thus, no improvement whatever may be seen for two or three weeks. In the cases cited above it will be noticed that, in three, no improvement occurred until the sixth week. In the average case the improvement is gradual. Instead of wetting the bed every night there will be nights at short intervals when there will be very slight incontinence, or none at all.

Usually after a few weeks' treatment the incontinence entirely ceases. The mistake frequently made is to stop the atropin at this

point. When this is done there is usually an immediate return of the trouble. The full treatment should be continued until the child has ceased wetting the bed for at least two weeks, when the daily amount of atropin should be reduced one-half and kept at this point for six weeks. If at the end of two months from beginning treatment there is no incontinence, the drug may be discontinued, but the dietetic regulations, particularly the "dry supper," should be continued for three months longer. It must be remembered that the element of habit, which has become established, is hard to overcome, even after the neurosis and the sphincter weakness have been corrected.

Strychnin and tincture of cantharides have been advocated by pediatric writers. In weak, poorly nourished children strychnin may be added to the iron or oil tonics, and, as a tonic, be of service in improving the general condition of the patient, and indirectly be an aid in the treatment of the enuresis. When incontinence occurs only during the day, the dietetic regulations are the same, with the exception that the fluids allowed need not be curtailed unless the quantity is excessive. The dosage of atropin is the same, but the time of administration should be changed to after breakfast and after luncheon, instead of at 4 and 7 P. M. In addition to the atropin, strychnin should always be given in cases of incontinence by day, as a lack of development or a relaxation of the sphincter is more of a factor with them than is failure of nerve coördination.

A fact to be taken into consideration in making a prognosis as to the probable duration of the treatment in a given case is the size of the bladder, since a child who has suffered from incontinence both by day and night may have a small and contracted bladder because of lack of development from disuse. In one of my cases, in a girl five years of age, the bladder had a capacity of but one ounce. The most reliable means of determining the size of a bladder is by measuring the amount of sterile water which can be introduced through a catheter.

ALBUMINURIA

Albuminuria may be either *transient*, *cyclic*, *febrile*, or *paroxysmal*, these terms indicating the different conditions under which albumin is found in the urine. Aside from the albumin, there may be no indication of organic kidney disease, either clinically or microscopically. In children the presence of albumin without other signs of trouble is of much greater import than is a similar condition in adults. The absence of proof of a kidney lesion does not mean that such a process may not exist. My own experience with cases of so-called functional albuminuria has not been a particularly pleasant one.

More or less persistent albuminuria, regardless of its association with muscular exertion or mental excitement, means that a tempo-

rary change is taking place in the renal epithelium. Frequent repetition of such processes readily leads to organic changes, and I am always disturbed by the presence of albumin, as I consider the condition one not to be lightly regarded. One of my cases, now under treatment, shows a trace of albumin after eating an egg, and in three of my cases, a diet rich in meat and eggs will invariably be followed by albuminuria.

Treatment.—The management of these cases involves the discovery and removal of the source of the irritation. If caused by emotion, exertion, or diet, a correction of the child's daily habits should be made along rational lines. I require these patients to be given a diet free from eggs, while red meat is allowed not oftener than twice a week. They are to avoid sudden exposure to cold, to wear flannel next to the skin nine months in the year, and lightweight silk-and-wool undergarments during the hot months. They are not allowed to indulge in hard play. Baths below 80° F. are not to be given them. Ocean bathing is prohibited. A salt bath (page 31), followed by a brisk friction with a coarse towel, is given at bedtime. The activity of the skin is thus insured. The bowels are kept open by the free use of fruits and the malted foods. If a laxative is required, salines are preferred. The case should be under observation, the above precautions observed, and the urine examined at intervals of two or three months for one year after the last negative examination for albumin.

ACUTE NEPHRITIS

Nephritis, in common with many other ailments of children, may be either mild or severe. It may be so severe as to cause death in a few hours or so mild as to pass unrecognized. The disease is rarely primary, being usually due to some systemic infection. The treatment of the severer forms of nephritis is often open to the most emphatic criticism, reflecting as it does the present methods of the schools, in their advocacy of forced, indiscriminate water-drinking, the exclusive milk diet, and the more or less indiscriminate use of diuretic drugs. Every one of these measures is capable of, and has been productive of, no little harm. Too great emphasis has been placed upon forcing the kidneys to act and too little upon the necessity of relieving them of the work for which they are temporarily incapacitated. The advocacy of drinking large amounts of water when the kidneys, distended with blood and the tubules obstructed, are secreting but very little, does nothing but harm. Under similar conditions, heart stimulants, such as digitalis, which forces more blood into the kidneys, necessarily make a bad condition worse.

Treatment of Mild Cases.—In treating nephritis, there are several factors to be kept in mind. Because a case is mild it should never be given scant attention. Nephritis in a child may be most insidi-

ous in its course. The mildest case, while not treated in all respects like a more severe one, should be given every possible attention as to rest in bed and diet, for through neglect, even for a very few hours, it may become most severe.

A child with nephritis must be kept in bed with the temperature of the room at about 70° F. He should be protected from drafts of cold air. Silk, a mixture of silk and wool, or flannel should be worn next to the skin.

Diet.—The nutrition of the patient is to be maintained by food which will not add to the existing trouble. We are told in the books that nitrogenous food, such as meat and eggs, is to be avoided in order to relieve the kidneys from the work of the secretion of urea and creatinin, and yet often we are advised in the very next line to give a full milk diet, which in a child from five to ten years of age means from two and one-half to three quarts daily, which, it will be remembered, contains 4 percent of nitrogenous food proteid. A diet necessitating that large amount of nitrogenous waste (by-products) will have to be excreted by the kidneys. In order to maintain the nutrition of the patient, proteid is necessary, and may be supplied by the use of a moderate amount of milk. For a child under five years of age, from sixteen to twenty ounces of full milk should be given daily—never more than twenty ounces. This is diluted with equal parts of cereal gruel, No. 1 or 2, with the addition of one teaspoonful of sugar (see formulary, page 130), and given in quantities of from six to ten ounces at four-hour intervals. This supplies all the nourishment necessary for a patient of this age. In order that the diet may not become monotonous to the child and cause loss of appetite, as is almost always the case when full milk is used, the taste of the food may be changed by the use of cereal gruels of different kinds. Broths and beef extracts are not given because of their creatinin content. Zwieback and butter, stale bread and butter, prune-juice, thin apple sauce, and orange-juice may be given in order to improve the digestion and add variety to the diet. Inasmuch as milk cannot be taken at the same time as fruit by many patients, it may be given between meals or with a plain meal gruel.

Bowel Evacuation.—A patient with nephritis, no matter how mild, should have two movements daily. These should be rather loose. The use of the fruit-juices may be sufficient to keep the bowels relaxed. If a laxative is necessary, citrate of magnesia or, in very young children and infants, milk of magnesia may be given in such doses and at such intervals—either of twelve or twenty-four hours—as may be necessary to produce the desired results. Twenty-four hours should not pass without an evacuation of the bowels. The patient should always have an enema at bedtime, if no passage has taken place during the preceding twenty-four hours.

There should be a warm sponge-bath daily, the body being sponged and dried in sections under a flannel blanket.

Prophylaxis.—If during scarlet fever or any of the infectious diseases the physician takes the precaution of having nitric acid and a few test-tubes at the home of the patient, so that the urine may be tested for albumin at each visit, with a reasonably frequent microscopic examination at his office, a nephritis may be detected before the more active clinical signs of the disease appear, and thus by placing the patient promptly under the above management, usually but little trouble will be experienced. In fact, in a majority of the cases the above suggestions are all that are necessary to carry the patient safely through an attack, if the kidney involvement is detected early and if diuretic drugs are omitted from the treatment. The use of additional measures for the more severe cases will depend, to a considerable extent, upon the individual case.

Treatment of Severe Cases.—When there is fever with partial suppression of the urine, only one-half the usual quantity being passed and that loaded with albumin, blood, and casts, with perhaps beginning edema, colon flushings (page 518) with a normal salt solution at a temperature of 110° F. are to be used. The flushings have the effect of increasing the functional activity of the kidneys. For a child from five to ten years of age, one pint of the warm saline solution may be thrown into the colon. An effort should be made to have the child retain it by having him rest on his left side with the buttocks elevated on a pillow. In young children from eight to twelve ounces may be used, and in infants under nine months, from four to six ounces is all that we may hope to have retained. The flushings should not be repeated oftener than at twelve-hour intervals, unless the condition is urgent, as an intolerance of the parts is readily brought about by too frequent manipulations.

If there is a hot, dry skin with a tendency for the temperature to remain above 102° F., tincture of aconite is given in small doses. For a child three years of age, one-half drop is given at two-hour intervals. Older children may be given one drop at a dose. It is rarely wise to increase it above two drops at two-hour intervals even in children above ten years of age. Only sufficient should be given to produce a slight diaphoresis, for by keeping the skin constantly moist the blood-vessels of the kidneys are relieved of the tension to which they have been subjected.

In the severer forms with edema or anasarca, cases in which but two or three ounces of urine are passed daily, more active measures will be required. In these urgent cases the diet should consist temporarily of thin gruels of barley, granum, or rice (No. 1), with sugar added to make them more palatable, and diluted fruit-juices given between the feedings. In a carbohydrate diet there are no by-products irritating to the kidney. Water should be given scantily,

sufficient fluids being given in the food. Active measures to increase the diaphoresis and thus relieve the kidneys must be instituted. The best means of doing this is by the use of hot colon flushings, hot packs, and hot baths. In these cases it is by attempts at forcing the kidneys, by the use of digitalis and the alkaline diuretics, that we do an immense amount of harm. Digitalis drives more blood into the kidneys and thus increases the congestion. The alkaline diuretics disturb the stomach, which is already showing signs of food intolerance. Colon flushings at 110° F. are now to be used every six hours. This is probably one of the most valuable means we possess for relieving the congestion of the kidney and inducing a flow of the urine.

Heat, either dry or moist, is to be brought immediately into use in order to stimulate the skin to vigorous action. Both dry heat and moist heat have their advocates. Placing a child in a warm bath at 105° F., keeping him there for a few minutes, drying rapidly, and immediately putting him into bed, surrounded by hot-water bottles, will usually produce diaphoresis. A thermometer should be placed under the bed-clothing so that excessive heat may readily be detected. I have seen pronounced weakness produced by excessive heat used for such a purpose. The child should not be allowed to rest in a temperature higher than 120° F., and this should not continue for over ten minutes. A temperature of 105° F. or 110° F. may be maintained for an hour if necessary. If the packs are used, they may be repeated once in six hours. The disadvantages of a hot bath are due to the fact that it necessitates considerable handling, which to some patients is a cause of no little excitement. In such cases, dry heat may be substituted. The patient is warmly clad in flannels and hot-water bottles are placed near him. This may be sufficient to induce perspiration. A device which I use consists of a funnel attached to a one-inch brass pipe which is bent in the middle to a right angle and which conducts the warm air under the bed-clothing. The heat is generated by a kerosene lamp, over the top of which an inverted funnel is placed at a sufficient distance to allow combustion to take place. The Kilmer croup kettle has an appliance which may be used for this purpose (Fig. 40).

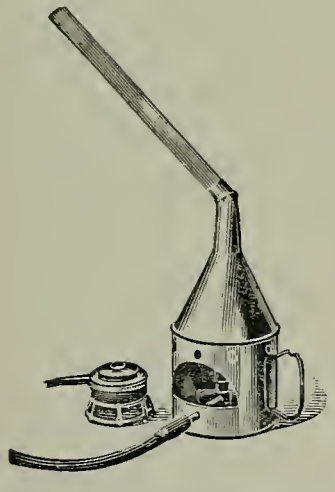


Fig. 40.—Hot-air Apparatus of the Kilmer Croup Kettle.

While a free secretion of urine is desired in these cases, we must not be content with that alone. Uremia may occur even while the normal amount of urine is being passed. A quantitative test for urea should be made in all severe cases in order to determine the amount excreted. Normal human urine contains, roughly speaking,

2 percent of urea, which occasionally in health rises to 3 per cent. Approximately 0.5 gram of urea is excreted per kilogram of body-weight. The proportion in children is relatively higher.[1]

Treatment of Uremic Convulsions.—Vomiting is one of the first symptoms of uremia. When it occurs, all food should be temporarily withheld from the stomach and nutrient enemata given by rectum. Completely peptonized skimmed milk is our best means of nutrition, from four to twelve ounces being given every four to six hours. It is best to give large quantities at long intervals—every six hours is best, as the manipulations with the tube have a tendency to produce intolerance on the part of the gut. The tube should be introduced at least eight inches into the bowel and the solution used should be lukewarm. A temperature of 95° or 100° F. will best be retained. In addition to the use of colon flushings and external heat, uremic convulsions should be controlled with chloroform or the rectal administration of the bromids or chloral. For a child under three years of age, from two to three grains of chloral may be given with eight grains of bromid of soda. After the third year, three grains of chloral may be used with from eight to fifteen grains of bromid of soda. It is best retained when given in at least four ounces of mucilage of acacia or skimmed milk, the enema being repeated in four or six hours.

When heart stimulants are required, tincture of strophanthus is usually given—from one to two drops at two-hour intervals to a child under three years of age. After this age, from two to three drops may be given. Digitalis is sometimes used as a heart stimulant during convalescence, after the secretion of the urine has been established.

Convalescence.—Convalescence is often tedious in these cases. The child should not be allowed to be out of bed until albumin has disappeared from the urine. For at least six months after an attack, the urine should be examined weekly. Light-weight woolens should be worn next to the skin during the entire year and every effort made

[1] R. Bradford, in Allbutt's "System of Medicine":

AMOUNT OF UREA EXCRETED ON THE BASIS OF 0.5 GRAM PER KILOGRAM.

1 year	Boys 9.29	4.645	gms. in 24 hrs.
	Girls 8.24*	4.12	gms. in 24 hrs.
3 years	Boys 14.14	7.07	gms. in 24 hrs.
	Girls 13.60*	6.80	gms. in 24 hrs.
7 years	Boys 22.44	11.22	gms. in 24 hrs.
	Girls 21.78*	10.89	gms. in 24 hrs.
10 years	Boys 30.22	15.11	gms. in 24 hrs.
	Girls 29.07*	14.535	gms. in 24 hrs.
13 years	Boys 40.04	20.02	gms. in 24 hrs.
	Girls 41.36*	20.68	gms. in 24 hrs.
16 years	Boys 56.09	28.045	gms. in 24 hrs.
	Girls 51.24*	25.62	gms. in 24 hrs.

* Figures of Boas, quoted from Holt.

to protect the patient from sudden exposure to the influence of cold air. With the advent of future illness with fever, even though it does not occur for a year or two afterward, unusual precautions should be taken to protect the child, in view of a possible reinvolvement of the kidneys with, possibly, a resulting chronic nephritis. Meat and eggs should be given scantily for a year after an attack. Exercise calling for great muscular effort should not be allowed for a considerable time, at least for a year after all trace of the nephritis has disappeared. I advise that, when possible, the winter after an acute attack be spent in a warm climate, such as that of Florida or Lower California.

Scarlatinal Nephritis.—A form of acute nephritis which deserves particular attention occurs early in malignant scarlet fever. The onset is very abrupt. But little urine is passed, and this is filled with albumin and casts and blood. In a recent case complete suppression occurred without previous warning and the child died in thirty-six hours, the duration of the entire illness being but seventy-two hours. There was no edema. The child became comatose and died from the uremia and the intense scarlatinal poisoning. In these cases repeated hot baths and packs, 105° to 110° F., should be used in spite of the high temperature which is usually present. Frequent hot colon flushings, 110° F., should also be given. Heart stimulants hypodermatically may be of value. The prognosis in these cases is very unfavorable.

CHRONIC DIFFUSE NEPHRITIS

This disease is rarely seen in children under three years of age, and it is almost invariably the result of an acute process which ran its course unrecognized, or of faulty management following an acute nephritis. The following history is quite a common one: A patient who came under my care three years ago with chronic nephritis gave a history of having had three distinct acute attacks during the previous four years, with intervals of apparent health. The urine had not been examined during these intervals nor had she had the advantages of proper treatment.

Treatment of the Milder Cases.—The management of chronic diffuse nephritis in children resolves itself into care in four respects: diet, climate, baths, and exercise.

If the patient is confined to the bed, the diet should be the same as suggested under acute nephritis. One quart of milk may be given daily. If the child is up and about, meat may be given once every second day. Eggs should be excluded. In other respects the diet should be simple, as outlined for well children (page 134), this being ample for nutrition.

The child should receive one warm bath—95° to 100° F.—daily, followed by a brisk friction with a dry towel.

An outdoor life is of decided advantage; exertion, however,

should not be allowed to the point of fatigue. Contests or stress of any kind, mental or physical, should not be permitted.

If possible, the child should spend the colder months in a climate which is not subject to sudden or wide variations in temperature. The climate furnished by Florida or Lower California is advocated when the parents are financially able to give the patient the benefit of it. If, however, he must be kept in his home, which does not offer the advantages of an equable climate, great care should be exercised in preventing sudden chilling of the skin surface. Woolens should be worn next to the skin at all seasons of the year. Frequent examinations of the urine should be made, not only for albumin and casts, but for urea as well. Sudden attacks of uremia may occur even while the patient is passing an excessive amount of urine.

Treatment of the Severer Cases.—The patients are always the occasion of a great deal of solicitude. My results have not been brilliant. In some of my cases the illness began after an infectious disease, usually scarlet fever, and ran a slowly progressive course, which under the best of management defied every effort, the illness terminating fatally in three months to a year.

In other cases improvement occurred. Casts and albumin disappeared from the urine and the child was apparently well. An exposure, some intercurrent disease, or from some unknown cause an exacerbation occurs, and the attack is repeated, usually of a graver nature than the previous one. The urine becomes scanty and loaded with albumin and casts, the child becomes edematous and pale. Treatment will perhaps relieve the condition, to be followed by another attack in three to six months, with an interval of apparent health. In one girl four years old, five distinct recurrences took place before death, which completed the fifth attack. A girl nine years old gave a history of a chronic nephritis lasting two years. For six months, since under my care, the kidney condition remains apparently normal. A boy aged four remained well for two years after an illness covering six months. After the period he passed from under my observation.

The management of the suppression and anasarca is very much the same as for the condition occurring in acute nephritis (page 359).

Diuretics with which the physician is familiar and has faith may be given well diluted, so as not to disturb the stomach.

In the mild cases the diuretic potash salts, spirits of ether, nitrosa, and infusion digitalis appear to be of benefit.

In the severe forms of chronic diffuse nephritis I have yet to see a diuretic of the slightest value, as I have within the last three months seen two cases in which every possible diuretic and combination of diuretics were used without avail. Both of these patients were girls; one terminated fatally after six weeks' illness. The second girl, three years old, was a patient in the Babies' Hospital, in my service. She

presented the typical picture of advanced chronic nephritis (see Fig. 41). The usual treatment with calomel, salines, colonic flushings, and hot packs and diuretics failed to make any impression. The urine presented the usual changes and was very scanty. After two weeks of treatment without making any impression on the case, the child becoming constantly worse, the Edebohl's operation of decapsulation of the kidney was performed by Dr. William A. Downes, of New York City. The kidney secretion gradually increased, the urine showing but a trace of albumin two weeks after the operation.

Fig. 41.—Chronic Nephritis Before Edebohl Operation.

Fig. 42.—Same Case as Fig. 41 After Edebohl Operation.

The thirteenth day following the operation the child had lost $16\frac{1}{2}$ pounds in weight and presented the appearance seen in Fig. 42. There was an interval of two weeks between the time of taking the two photographs.

During the convalescence from the operation the child developed a very severe colitis, in which she died six weeks after the operation. I look upon this case as a remarkable demonstration of temporary value (at least) of decapsulation of the kidney. Unfortunately the intercurrent colitis terminated the life before the permanent effects could be determined.

Chronic interstitial nephritis is very rare in children. I have seen one case in a patient ten years of age who had been ill two years. He was passing a large daily amount of urine—60 to 90 ounces—an examination of which showed a specific gravity of 1.002. There was but a trace of albumin. The boy died in a few weeks of acute uremia.

GLYCOSURIA

Temporary glycosuria or dietetic glycosuria is of frequent occurrence and is of little significance. It usually means that more sugar is being taken than can be cared for by the economy, and with a discontinuance of its excessive use the sugar disappears from the urine.

Illustrative Cases.—In a series of observations made several years ago at the Country Branch of the New York Infant Asylum, ten children were selected for high-sugar feeding, 10 percent sugar mixtures being given to those under one year of age. Every case showed glycosuria after twenty-four hours of the high-sugar administration.

Two most interesting cases of persistent glycosuria without any other manifestation of illness have been under my observation for the past six years. That sugar existed in the urine was discovered by accident. How long it may have been present, we have no means of knowing. The mother, an unusually careful woman, conceived the idea that it would be wise to have the urine of all her four children examined. It was accordingly sent to me, and greatly to my surprise I found that two specimens, one from a boy of four years, the other from his brother of six, contained a large amount of sugar—3 and 3.5 percent respectively. A careful examination was at once made of both patients, and nothing abnormal discovered. The children were strong, there was no unusual thirst and no polyuria, and, further, the examination of the urine failed to reveal the presence of either acetone or diacetic acid. They were placed on a rigid anti-diabetic diet (page 367), which reduced the sugar to 1.5 and 2 percent respectively. During the seven years that have since intervened, the boys have made satisfactory physical and mental progress; they have attended school regularly except when prevented by the usual ailments of childhood. Both have undergone operation for adenoids and enlarged tonsils under ether anesthesia, with no more than the usual discomfort. They have made normal increase in stature, weight, and strength, and are perfectly normal in appearance. During these years monthly examinations have been made of the urine. There has never been less than 1.5 percent of sugar in either, and during the past eighteen months it has rarely been below 3 percent or above 6 percent, and that in spite of the most careful diet. There never has been polyuria or extreme thirst. The children have been seen by several consult-

ants in New York City and have been under the treatment of three well-known specialists in Germany. Recently acetone has been found in the urine of one of the children. Probably every variety of treatment which might be expected to exert an influence on the sugar production has been tried for protracted periods without a particle of influence in reducing it. Indiscretions in diet increase the sugar, otherwise it ranges as stated above. None of the physicians here or abroad who have treated the boys has seen similar cases. They are cited in detail and are of much interest as showing the inefficiency of medication in glycosuria and the effects of diet, and, furthermore, they present a clinical picture which is most unusual.

It has been suggested that the glycosuria may be due to some persistent and unusual toxemia from intestinal sources, and the cases are now being studied on that theory.

DIABETES INSIPIDUS—POLYURIA

Persistent polyuria—diabetes insipidus—is rare in children. I have personally known of but one case. It had been but little influenced by six weeks' treatment at the time it passed from under observation. Temporary or transient polyuria is of occasional occurrence and appears to be entirely of nervous origin. It is usually seen in nervous girls of hysterical tendencies. It is most apt to develop at the close of the school year, when a child is considerably reduced or somewhat excited in anticipation of undergoing examinations. The patient is thirsty, drinks quantities of fluid, and passes a great deal of pale urine of low specific gravity. Full doses of bromid of soda—ten grains three times daily—may temporarily relieve these conditions. In all the cases which I have seen, the polyuria ceased in a short time, with the cessation of school duties and a change of environment.

DIABETES MELLITUS

But little of promise is to be offered in the management of diabetes mellitus in children. It is a particularly fatal disease. I have treated five cases, and all have terminated fatally. This is similar to the experience of all observers. The youngest patient was three, the oldest nine years of age. The manifestations of the disease were the same in all. There were excessive thirst, rapid loss in weight, the passage of large quantities of urine containing varying amounts of sugar, and a dry, roughened skin. Not one of my patients lived a year after the commencement of the disease. Death usually takes place in less than six months.

The patients were treated by limiting the amount of fluid taken, by restricting the diet, and by using the opium derivatives and arsenic to the point of physiologic effect—all without the slightest benefit. The sugar output was reduced, but the patients showed not even temporary improvement as to their general condition.

Children with diabetes mellitus usually die from exhaustion or from some intercurrent disease like pneumonia. Uremia is of less frequent occurrence in children than in adults.

Diet.—The following are permissible articles of diet for a child ill with diabetes: Soup and broths made from meat, fresh and salt fish, shell-fish occasionally, egg, fowl, and game, smoked meats, sweet-bread, cheese, spinach, celery, lettuce, cucumbers, cranberries, radishes, string beans, asparagus, squash, cabbage, egg-plant, tomatoes, onions, turnips, mushrooms, gelatin jellies sweetened with saccharin, butter, cream, olive oil, cod-liver oil, lemon, grape-fruit, sour apples, blackberries, raspberries, watermelon. Nuts of all kinds may be eaten. Only bread and biscuits made from gluten flour should be used. It is impossible to procure a starch-free gluten flour; the flour, however, should not contain more than 20 percent of starch.

VESICAL CALCULUS—STONE IN THE BLADDER

Stone in the bladder is rarely seen in children under ten years of age. Two cases only have come under my observation. The patients were boys aged respectively five and seven years. The treatment of the condition is entirely surgical.

CYSTITIS

Cystitis is an uncommon affection in children and I have never seen a case in a boy. In girls, however, it is of occasional occurrence, and is usually due to an infection of the bladder with the colon bacillus.

There is little or no pain attending urination, but there are frequent calls to urination, of the most urgent character. All of my cases of cystitis have suffered from incontinence of urine, during both waking and sleeping hours. We are sometimes told by the mother that the child asked to be taken to the toilet, but passed the urine before reaching it. Inability voluntarily to control the urine during the day, extending over a considerable period of time, points strongly to bladder involvement, either to stone, which is exceedingly rare in children, or to cystitis. An examination of the urine usually clears up the diagnosis so far as the cystitis is concerned.

Treatment.—The treatment is largely through internal medication, and is not particularly promising as regards the promptness of a cure. Irrigation of the bladder may be attempted. It has been of very little service in my hands. Bladder-washing is carried on with no little difficulty and annoyance and usually with unsatisfactory results. My best success has been by the use of urotropin—three grains, three times daily to a child three years of age. In cases due to the colon bacillus it is well to alternate the urotropin with citrate of potash, three grains of which are given three times daily, the urotropin being given alone for five days, followed by the citrate of potash for the same time, alternating thus, when necessary, until a cure is effected.

ACUTE PYELITIS

Pyelitis is a rare disease in children. All of my cases, nine in number, have been in girls under two years of age. In a great majority of the cases the disease is due to an infection of the pelvis of the kidney by the colon bacillus. In two there was a colicystitis. The only symptoms in two of the cases were repeated severe chills, a very unusual occurrence in an illness in an infant, and a high temperature with a tendency toward wide fluctuations. The severe chills, the temperature ranges, and the absence of other clinical signs, together with a negative blood examination, suggested pyelitis. Examination of the urine revealed the colon bacillus. In the seven other cases there was an irregular temperature ranging from 100° to 105° F., which had continued from several days to three months.

Four had been treated for different diseases, both typhoid and malaria having been considered. In two the temperature range was quite remarkable. As a rule, there is more or less temperature every day. In these two cases before and while under treatment there would be periods free from fever for five to ten days. Then there would be a rise lasting from twenty-four to forty-eight hours, sometimes not over twelve hours. In one of these, a girl of ten months, treatment was required for three months before the urine remained permanently free of pus. She had been ill six weeks. In the second case, a girl of thirteen months had been ill three months, probably longer. She was under my immediate care for six weeks without great improvement. She was then taken to a summer resort and, at the time of writing, ten weeks after instituting treatment, there is an occasional rise of temperature.

Medication.—The treatment of pyelitis which has been successful in all of my cases consists in the use of urotropin. For a child one year old, from 1½ to 2 grains may be given at two-hour intervals, not over six doses in twenty-four hours. The urotropin acts best in an acid medium, the benefit resulting depending probably upon its being excreted unchanged in the urine, where it undergoes decomposition with the formation of formaldehyde; this does not take place when the urine is alkaline. If the illness promises to be persistent, as in the two last but one, I give the urotropin interruptedly—*i. e.*, giving it for five days and rest three days. If the urine is very highly acid the citrate of potash may be given during the period of rest from the urotropin. The intervals of rest from the administration of urotropin is indicated because of the possible irritant effects produced on the kidney by the drug during prolonged usage. It has not been necessary in my cases to resort to the use of the coli vaccine for this form of urinary infection.

Time Required for Cure.—There should be a period of six weeks free from pus before the case is pronounced well. The urine may be free from pus to-day, but present to-morrow.

THE MALE GENITALS

Practically every male child is born with an adherent prepuce and with more or less constriction at the preputial outlet. The penis is to be considered normal only when the foreskin can easily be retracted, laying bare the glans.

The adhesions and constrictions may be relieved by moderately stretching the foreskin and breaking up the adhesions with a fine blunt probe, after which the glans should be cleansed, oiled, and the foreskin drawn forward over it. The cleansing of the parts with castile soap and warm water, which necessitates a retraction of the foreskin, should be practised at least every second day. This not only keeps the parts clean, but prevents the later formation of adhesions and a possible phimosis.

Hypospadias and epispadias are conditions essentially surgical, and therefore are not considered here.

PHIMOSIS

Phimosis is a condition caused by a constriction or narrowing of the preputial orifice, sometimes to a pin-point. In cases where the foreskin is tightly bound to the glans by adhesions, the urine may be emitted in drops; in other cases the prepuce "balloons out" during urination and the urine dribbles away. The opening may be sufficiently large to show under pressure the margin of the urethral opening, and urination will be but little interfered with.

Treatment.—The cases in which urination is impeded require prompt relief. This can be furnished temporarily by introducing a small probe or a director and carefully slitting the skin with sharp-pointed scissors until the glans is reached. The child should be carefully held by an attendant during the operation and great care exercised in introducing the director. After the operation a wet dressing of bichlorid of mercury, 1 : 6000, or a saturated solution of boric acid should be applied to the wound until healed.

A few years ago I saw a case in which the probe had been introduced into the urethra and followed up by the scissors, which had made a slit involving one-third of the glans.

Phimosis may be productive of various nervous manifestations, such as restlessness and irritability. In two of my cases convulsions were apparently caused by phimosis. Both children had repeated convulsions until they were circumcised. Both suffered from marked phimosis with retained smegma and irritation of the prepuce.

Circumcision should never be delayed in cases of phimosis, as it furnishes the only satisfactory means of relief. Stretching is very apt to be followed by re-contraction, which only intensifies the original condition, while the unavoidable laceration of the mucous membrane may open a favorable field for infection. In hospitals and outpatient work, examples are numerous of the harm resulting from force and lack of cleanliness in the management of these simple and easily remedied conditions.

PARAPHIMOSIS

Paraphimosis is produced by the retraction of a tight foreskin, which later becomes so contracted behind the corona as to prevent the return venous flow. As a result, the glans becomes greatly swollen, deeply congested, and edematous. Urination is impossible. The cases which I have seen have all been produced by the mother or nurse in an attempt to retract a tight foreskin according to the doctor's directions, after he had stretched the prepuce for phimosis.

Treatment.—If the retracted skin is edematous, it may be punctured in various places to let out the fluid. Reduction may then be attempted by taking the glans between the thumb and the first and second fingers of the right hand and making gradual pressure backward against the thumb and first finger of the left hand, which grasps the penis behind the prepuce. If the reduction cannot be effected in this way, as occasionally happens, if the case is of long standing or the contraction very tight, a longitudinal dorsal incision may be made in the skin at the site of the constriction. After the reduction a wet dressing of a saturated solution of boric acid or of bichlorid of mercury, 1 : 10,000, should be kept constantly applied to the parts until the swelling has subsided, when circumcision should be done.

BALANITIS

Balanitis is a swelling and inflammation of the foreskin due to a local infection. Unskilled manipulation in stretching the prepuce readily produces a laceration, opening up a means of entrance for bacteria. In severe cases the parts first show congestion and then edema. I have seen patients with long foreskins which were twisted and swollen to a size three or four times that of the penis. In advanced cases there will be suppuration beneath the foreskin with a purulent discharge from the orifice.

Treatment.—If the case is seen early, a wet dressing made by wrapping the parts in gauze or old linen, which is saturated with an ice-cold solution of bichlorid of mercury 1 : 10,000 and changed every half hour, will usually be effective. If there is much edema, puncturing in several places, after disinfection, should precede the wet dressing. If there is a purulent discharge, the sac should be gently

syringed at least twice daily with a 3 percent solution of hydrogen peroxid, diluted one-half with water.

When the suppuration has ceased, with a return to normal of the parts involved, circumcision should be done. Operation during the acute stage, particularly with suppuration present, should be avoided unless the condition is very urgent.

CIRCUMCISION

Many times during the year I am asked the question, "Shall we have the baby circumcised?" My answer as to the advisability of this operation, as a routine measure, is in the affirmative. The operation during the second week of life is a trivial matter. I am convinced that it would be for the best interest of every male if he were circumcised. In one out of every five male infants circumcision is a necessity both for his comfort and his health. In marked degrees of phimosis and balanitis, circumcision is the only means of relief.

An important reason, to my mind, for the operation as a routine measure, is that it settles at once and for all time the toilet of the parts. The penis after a proper circumcision requires no further manipulation on the part of the nurse. The daily retraction of the foreskin and bathing of the parts is one of the best means of teaching the child self-abuse. When this is not done every day or at least every second day, trouble is sure to follow sooner or later, in the form of adhesions and inflammation of the prepuce. The sensations produced by the retraction and the washing are not unpleasant and the child soon learns to produce them himself, through leg rubbing, hand pressure, or otherwise. (See Masturbation, page 455.) Time and again, after having stretched the foreskin and broken up the adhesions, operations having been refused, I have had the case return in a few weeks with the adhesions and the contractions as bad as before, the nurse or mother, timid or neglectful, having failed to follow my directions. With phimosis it may require considerable skill to draw the foreskin forward after a retraction. It is not always safe to permit the attendants to attempt it. Not a few times I have seen a paraphimosis (page 370) which resulted from an inability to bring forward a retracted tight foreskin.

The dorsal slit, so often practised as a substitute for circumcision, is to be used only as a temporary expedient, and as such may be employed whenever circumcision is refused. Never, by any means, does it take the place of circumcision. It invariably leaves a long, redundant flap of skin, which easily becomes irritated, causing no little discomfort. For the child, it also is a great temptation to manipulation.

GONORRHEA IN THE MALE

Specific urethritis in male infants and "runabout" male children is a condition seen but rarely, only one case having come under my observation. This was in a four-year-old boy whose home was in a small tenement and who had been repeatedly exposed through another member of the family, who, having imbibed the fallacy popular among the ignorant, hoped to rid herself of the trouble by giving it to the boy!

The treatment in this case was with irrigation of the urethra with a 1:10,000 solution of the permanganate of potash. The irrigation was used at twelve-hour intervals for two weeks. After four weeks' treatment the boy passed from my care, having been placed in an institution. During the last two weeks of the treatment the irrigations were used once daily. There was no further trouble from the urethritis.

ORCHITIS

Swelling of the testicles is of very infrequent occurrence in the young. I have seen but two cases—both complicating mumps.

The management is rest in bed, saline laxatives, if necessary, and support of the inflamed testicles by a wide strip of adhesive plaster extending from thigh to thigh. The application of warm sedative lotions gives much relief to the pain and discomfort and appears to shorten the duration of the attack. Lead and opium solution, U. S. P., applied on several layers of gauze and covered with cotton-wool, was a satisfactory treatment in the above cases. The dressing should be repeated every three hours. After an orchitis a suspensory bandage should be worn for several months.

HYDROCELE

Hydrocele in the different forms in infants under one year of age is frequently seen in children's institutions and in out-patient clinics for children. Not a few of these cases have been under treatment elsewhere. Drugs, such as the iodid of potash, have been given with an idea of absorbing the fluid—a valueless procedure. Some of the cases have been aspirated, and to others local counter-irritants have been applied. If there is a very large and encysted hydrocele, and if the parents are anxious for a speedy cure, aspiration with a hypodermic syringe may be done, remembering, of course, that the operation must be aseptic in every detail.

In a recent case which came to the out-patient service of the New York Polyclinic there had been an aspiration performed. The sac became septic and the child died from the infection.

Not more than one-eighth of the fluid need be withdrawn. After the withdrawal of the needle, the site of the puncture

should be dressed with collodion and aristol, one-half dram of aristol to one-half ounce of collodion. I have never found it necessary to inject into the sac any form of irritant, such as carbolic acid or iodin. In fact, fully 98 percent of the cases get well just as quickly without treatment. If the hydrocele is a small one, our management at the present time is to let it alone, and spontaneous recovery follows in from two to three months.

UNDESCENDED TESTICLE

In the normal male at birth both testicles should be in the scrotum. In a considerable number of cases one or both testicles may remain in the canal for a varying period, the descent usually taking place during the first year. When such descent does not occur, the condition may be considered abnormal. It is important not to mistake the condition for hernia and apply a truss. Not a little harm may result from such an error.

A truss should never be used in such a case and operative procedures should be delayed until puberty, unless discomfort is experienced or disease can be proved. I have known many cases in which descent did not take place until the third or fourth year. In one case it was as late as the tenth year.

THE FEMALE GENITALS

SIMPLE VULVOVAGINITIS

In simple vulvovaginitis there is an inflammation of the external genitals with a secretion of rather viscid mucus. There is moderate itching and a burning sensation about the parts—symptoms which may resemble those of gonorrheal infection. The cases in which there is a purulent discharge are particularly apt to be mistaken for gonorrhea. Bacteriologic examination in such cases is the only immediate means of differentiating the two diseases.

Ill-conditioned children and those improperly cared for furnish the majority of the vulvovaginitis patients. The disorder is to be regarded as one due to a low vitality rather than to a local infection.

Treatment.—Accordingly the management is largely constitutional: Outdoor life, suitable food, iron and cod-liver oil, are to be advised, and, in short, all the measures advocated in the section on Delicate Children are applicable here. Bathing the genitals twice a day with warm water and castile soap, followed by drying with absorbent cotton, prepares the parts for a dusting-powder which I have found useful in these cases. The powder used is of the following composition:

℞. Acidi borici.....gr. xxv
Pulveris amyli
Pulveris zinci oxidi.....āā ℥ss

The dryer the inflamed surfaces are kept, the more prompt will be the relief, so that if there is a tendency to a free secretion of mucus, the powder may be applied at intervals of two hours.

A convenient means of applying the powder is with an insufflator, which may be obtained from any apothecary. After the parts are packed with the powder, a dressing of old linen should be applied and held in position by a napkin binder. The powder should be reapplied often enough to keep the parts dry.

GONORRHEAL VULVOVAGINITIS

The disease is seen with great frequency in out-patient work. The specific infection is usually furnished by some member of the family or by some other infected child. It is readily transmitted by sponges, towels, napkins, etc.

In a typical case there is a profuse, greenish-yellow discharge. The parts may be swollen and edematous. The course of the disease is most protracted and there is no specific medication which we can use locally or otherwise.

Treatment.—It seems to me, after treating in many different ways several hundred of these cases, that keeping the parts clean through douching does more toward terminating the disease than does the use of any particular disinfectant wash or application.

Douching of the parts is to be practised four times daily, if possible, two quarts of water being used. It is useless to attempt the treatment of a case which cannot be douched at least twice a day. It may be remarked that it is a very trying treatment for both patient and nurse. Such is certainly the case, but we are dealing with a disease in which strenuous measures only give hope of cure. In order to use the douche most effectively, the child is placed on its back on a douche-pan. A glass, female catheter attached to a fountain syringe is all the apparatus required. The catheter is passed about one-half inch within the vaginal orifice and the water allowed to run. The lower end of the bag should not hang higher than two feet above the child's body. Boric acid is a safe drug in any household. For this reason it is selected instead of bichlorid of mercury, permanganate of potash or any other antiseptic. I am not at all sure that plain boiled water would not answer just as well. It would be difficult, however, to persuade many families to use the repeated douching without the addition of some antiseptic to the water. Accordingly, the mother or nurse is instructed how to prepare two quarts of a saturated solution of boric acid. This is used as a cleansing agent. After the parts are dried with sterile absorbent cotton, a dusting-powder, the formula of which is as follows, is used very freely:

℞. Acidi borici.....gr. xxv
Pulveris amyli
Pulveris zinci oxidi.....āā ℥ss

The powder is freely dusted into the vagina and over the diseased surface after the douche, and at two-hour intervals, during the time the child is awake, from early morning to late at night. I tell the attendants to *pack* the parts with the powder. Over this is placed absorbent cotton or gauze, which is covered with the napkin. The attendants should be warned of the danger of infecting themselves and other children in the household with towels, sponges, etc.; in fact, sponges should never be used in these cases. The danger of infecting the eyes, not only of the patient but of the attendants and others who may come in contact with the case, should be carefully explained. When washing or drying is necessary absorbent cotton or old linen should be used and immediately burned. A child suffering from gonorrheal vaginitis should sleep alone. Cheese-cloth napkins should be used and burned as soon as soiled.

A case treated as above may recover in three weeks, though usually from four to eight weeks are required, and in some cases the treatment must be continued for months. After we have arrived at a point where we consider the case cured, there will sometimes be a renewal of the discharge and the treatment must be resumed.

Before the case is finally discharged at least two bacteriologic examinations of the vaginal secretion should be made in order to determine positively the absence of the gonococcus.

NERVOUS DISORDERS

HEADACHE

A complaint of headache on the part of a child should always receive attention. It is unusual in children, and when it is repeatedly noted there is generally a good reason for it.

In children of any age headache may be an early symptom of meningitis, particularly of the tuberculous form, in which the headache may exist for days without other signs of illness. In eye-strain, headache is a very prominent symptom, and may be the only evidence that an ocular defect exists. In persistent headache that cannot otherwise be satisfactorily explained I invariably have the eyes examined. Headache is often the earliest sign of acute infectious disease, it being usually a premonitory symptom of scarlet fever, measles, or pneumonia. Persistent toxemia from any source may be a cause of headache. It may occur in nephritis and in malaria. The most usual toxic source, however, is the intestinal tract, in which there is generally the association of anemia as well. This condition may exist without constipation. Fatigue, as a result of overwork at school, or hard play and unusual excitement may be a cause of headache in neurotic children. It is frequently encountered in girls late in the school-year. Examination of the urine may show marked indicanuria. In three cases recently seen by me, headache was the only evidence of intestinal derangement.

Treatment.—The management of headache consists in the discovery and removal of the cause. An ice-bag or an ice-cloth applied to the head affords much relief in the acute febrile cases. Ocular defects should have the benefit of rest and suitable glasses prescribed by an oculist. Fatigue headaches are best controlled by limiting the amount of work and providing long periods of rest. Headaches due to intestinal toxemia with the usual accompaniment of anemia are oftentimes most difficult to relieve. In spite of our best efforts the intestinal digestion may remain faulty for a considerable time. A change of residence and a radical change in the habits of life are usually the best means of effecting a cure. The management of these cases is considered in detail under Persistent Intestinal Indigestion (page 173).

HYSTERIA

Hysteria in children is rarely seen before the third year. My youngest case was three and one-half years of age when first seen by

me, but the hysterical manifestations had been present for several months. Mental, motor, or sensory manifestations may predominate in an individual case, although all cases are associated more or less directly with an absence of mental control. Girls are much more frequently affected than boys, but some of the most typical cases coming under my observation have been among the latter.

We are taught by neurologists that hysteria is almost invariably of hereditary origin because of its apparent direct transmission from parent to child. It must be remembered that the child, in addition to being born of an hysterical mother, is thereafter in constant association with her. To my mind, in hysteria we have exemplified in the most perfect degree the effect of environment. A neurotic hysterical mother puts the whole family in a state of high nervous tension. I know of several such instances. A neurotic irritable father will make the whole family neurotic. I know of such instances also. Fortunately for the offspring, both conditions are seldom combined in one family. When they are, and I have the children of a few such families under my care, the future of the children is discouraging. When one of the parents is sufficiently normal to offset a reasonable degree of neurosis on the part of the other, a stable equilibrium may be maintained.

Imitation is one of the strongest characteristics of the growing child. How often, when arranging with the mother a diet-list for one of these nervous, ill-conditioned children, have I heard the child say that he "hated" cereals, or "hated" vegetables, or "hated" eggs or fowl; or that he "adored" some other article of food, this adoration and hatred, particularly the latter, often influencing the entire future of the child; for without a properly regulated diet for every day in the year, only an inferior type of adult can be the outcome. In such cases it will usually be found that the likes and dislikes of the child are identical with those of the parents, whose preference had often been expressed in the presence of the child. "Heredity" here furnishes to the parents a satisfactory explanation of the child's limitations in diet. It will usually be found that parents who live normally have children who eat normally.

Illnesses and ailments of different kinds should not be discussed before nervous and impressionable children. Time and again an investigation of a peculiar pain in a child's head, side, or back which cannot be accounted for by the physical examination will be explained by a similar pain in some older member of the family.

Illustrative Cases.—In one family I have seen three generations of genuine hysteria. In the first generation were the father and mother. The father, chronically irritable and neurotic, was a business man with large interests, rarely ceasing, when at home, to talk about his ailments and their remedies. The mother had marked hysteria. She indulged in frequent attacks, with apparent uncon-

sciousness lasting for hours. The daughter, brought up in this atmosphere, through heredity and environment soon became markedly hysterical. Both she and the mother, when some dispute arose in the family, which was not an infrequent occurrence, would have simultaneous attacks of hysteria. In due time the daughter married and gave birth to a daughter who promises to maintain the family traditions with certain additions of her own.

I have under my care a girl seven years of age who is in deadly fear of appendicitis and develops an attack of hysteria every time she has a pain. She can locate "McBurney's point" and knows the various stages in the development of the disease and the steps in the operation for appendicitis. The mother's appendix, suitably preserved, is among the family relics, whence it cannot be removed. The influence of heredity has perhaps had the effect of making the child alert, precocious, and impressionable, and such favorable soil and the constant association with the hysterical will almost surely develop hysteria in a child.

Treatment.—*General.*—My results with hysterical children have usually been very good or very poor, depending to a great extent upon my ability to separate the child from its family, by this statement the management of hysterical children is suggested. Remove the child, if possible, from the unfavorable family influence. The boarding-school has effectually cured several of my cases. Here the child is placed under the care of trained minds, teachers who bring out the good and correct the bad by reason, precept, and example, and who thus exert a continuous, beneficial influence. In the boarding-school, plain diet, pleasant occupation, agreeable association, and a scientifically regulated life replace the spoiling and coddling and oftentimes the unsuitable food, together with the endless nagging which the neurotic mother is very apt to indulge in, with the best intentions, of course, but nevertheless with a most unfortunate effect upon the child. If the child is too young for a boarding-school or if admission is denied him, he should be placed under the care of some kindly, well-balanced woman as companion and instructor, and see as little of his family as possible, otherwise but little can be expected from the treatment. Of course, the conditions must be explained fully to the parents in order that they may make an effort in the right direction as to their bearing toward the child. If the former conditions as to intimate association with the child continue, the good intentions, according to my observation, may last only a very few days. It is impossible to reform the habits of life of a neurotic adult. If he has grown that way, that way he will remain. The only hope for the child is in his complete removal from such unfavorable influences.

The further treatment of hysterical children consists in curtailing the mental and physical activities, which almost invariably

have been excessive. A rational scheme of living should be formulated. "Showing off" the child to visitors and others should be forbidden. If under ten years of age, he should retire at seven o'clock every night and rise at seven every morning. It is understood by the attendant that this does not mean 6.45 or 7.15. Every day after the midday feeding, the child should rest quietly in a darkened room for an hour or two. Whether he sleeps or not, he rests in a recumbent position with clothing removed. For such children exciting games of stress and competition of every nature are forbidden. An outdoor life is encouraged. A bicycle, a pony, an individual play-room in winter and a tent on the lawn in summer should be provided when possible. School instruction may be given, but the child is not to be crowded. The amount of study and work depends, of course, upon the child's condition. Until the tenth year, however, there should be but one morning session, of from one and one-half to three hours. The child is given a tub-bath or brine bath daily at 90° F. (page 31); at the completion of the bath he stands with his feet in warm water and is given a cool douche, at 60° to 70° F., the spray tube being attached to a faucet; or cold water may be poured down the spine. The application of cold water should be for a few seconds only and should be followed by a brisk rubbing with a rough towel, which should result in a decided skin reaction.

Treatment During Hysterical Seizure.—During a hysterical seizure the child should be treated with kindness but with firmness. No sympathy should be shown. The application of ice-water to the face and chest is usually sufficient to break up an attack. In some cases a certain amount of time appears to be required for a return to the normal.

Drugs.—Sedative drugs, such as the bromids, should not be used. Cases have come under my observation showing the bromid rash. Such treatment, as also the use of the opium derivatives, cannot be too strongly condemned. Drugs that increase the appetite and improve nutrition should be given. I have found that iron and arsenic answer well in these cases, as most of the patients show a secondary anemia. For a child from five to ten years of age the following prescription has been useful:

℞. Liquoris potassii arsenitis.....gtt. xc
Extracti ferri pomati.....gr. x
Quininæ bisulphatis.....gr. lx
M. div. et ft. capsulæ No. xxx.
Sig.—Take one after each meal.

If constipation results from the use of the small doses of iron, one-third to one-half grain of the extract of cascara may be added to each capsule. If the child cannot swallow a capsule the following may be used:

℞. Liquoris potassii arsenitis .....gtt. lxxij
Ferri et ammoniæ citratis .....gr. xxiv
Elixiris simplicis .....℥ss
Aquæ.....q. s. ad ℥iv
M.
Sig.—One teaspoonful after each meal in a glass of water.

The iron and arsenic may advantageously be alternated with pure cod-liver oil—one to two drams after meals—each being given for seven days. Alcohol should form no part of the medication of these children. In using the so-called liquid proprietary foods, it is to be remembered that some of them contain a considerable percentage of alcohol.

INFANTILE CONVULSIONS

Convulsions in the newly born are usually of an entirely different nature from those which occur after the third month. During the early days of life, a convulsion is always a matter of serious import, as it frequently is the result of a birth trauma and suggests a possibly serious brain lesion, which may terminate in early death or result in spastic paralysis or idiocy or both.

An appreciation of the causes of convulsions in older infants and in young children suggests the treatment. The predisposing causes are rachitis and other forms of malnutrition. While the rachitic child is particularly susceptible, the most vigorous is by no means exempt if the exciting cause is of a sufficient degree of severity. Uremic convulsions (page 361) are always preceded by evident kidney involvement, which may at once explain the cause of the seizure. The cause in at least 90 percent of the cases is an irritation within the gastro-enteric tract, due to a foreign body or undigested food, or the absorption into the circulation of toxins—the products of decomposition in the intestinal contents. In two of my patients phimosis with much smegma and irritation was the most plausible cause of the convulsions. Both had had several convulsions, which were not repeated after circumcision was performed. In a small percentage of the cases convulsions are the earliest manifestations of lobar pneumonia and scarlet fever. In fact, a convulsion may be a prodromal symptom of any of the infectious diseases. One of my patients had repeated convulsions until he was relieved of forty-three large roundworms. So frequently is intestinal toxemia a cause that when a child in apparent health is seized with a convulsion, it is safe to assume that it is of gastro-enteric origin; if such should not be the case, the treatment directed toward relieving the digestive tract is always advantageous, even if the convulsion is the first symptom of lobar pneumonia or meningitis.

Treatment.—When a convulsion occurs, the patient should at once be undressed and placed in a warm mustard bath (page 30) at a temperature of 105° F. While in the bath, there should be a brisk friction of the trunk and extremities, particularly the latter.

At the same time an attendant may give an injection of soap-water. In a great majority of the cases, in less than five minutes the child will show evidence of a return to consciousness. As soon as he can swallow, two teaspoonfuls of castor oil should be given. After a seizure the patient should be kept very quiet for twenty-four or forty-eight hours. An ice-bag or cold cloths should be applied to the head and a guarded hot-water bottle kept at the feet. The diet should be of the lightest. Chicken broth, weak beef-tea or chicken-tea, and thin gruels should constitute the nourishment for a day or two. A second seizure is more easily produced than the first, and a third easier than the second, and as about 10 percent of the cases of epilepsy are the outcome of infantile convulsions, it is the physician's duty to see to it that the indiscretion in diet which caused the first attack is not repeated.

In case the attack is a very severe one, when the child is slow to respond or when he passes rapidly from one convulsion to another, chloroform inhalations, regardless of the age, should be given in sufficient quantity to prevent the seizures until the intestinal canal can be emptied and sufficient sodium bromid and chloral can be given by mouth or rectum to prevent a recurrence. For a child under one year of age, eight grains of sodium bromid and three grains of chloral may be given by rectum in two ounces of mucilage of acacia. After the first year, from three to five grains of chloral may be given with from ten to twenty grains of sodium bromid. It is best to attach to the syringe a soft-rubber catheter, No. 18 American, or a small rectal tube. The catheter should be introduced for at least nine inches, so that the solution may be carried to the descending colon, where it will better be retained than if introduced with the small hard-rubber tip simply within the anus. The bromid and chloral may be repeated at intervals of from two to six hours, as required to control the convulsions, and continued in diminished doses as long as there are noticeable signs of nervous irritability, such as twitching and involuntary muscular contractions. If the child can swallow, five grains of sodium bromid, in one-half ounce of water, may be given, and repeated at intervals of from one to four hours, until the convulsions are controlled. Morphin hypodermatically is rarely required. It should be used only when other measures fail. A child one year of age may be given $\frac{1}{30}$ grain, which may be repeated in two hours, though usually it will not be necessary. Under one year $\frac{1}{50}$ to $\frac{1}{40}$ grain may be given; under six months, morphin would better be omitted.

Convulsions should never be lightly regarded. They may be serious in their immediate as well as in their remote possibilities. One convulsion may produce cerebral hemorrhage which may change the entire future of the patient, producing spastic paralysis or idiocy, or both. About 10 percent of the cases of epilepsy originate in indi-

gestion—the so-called "dentition convulsions." In these, rachitis plays an important etiologic part. It is the duty of the physician, in a given case, to ascertain the cause and so direct the future management of the patient as to avoid a recurrence of the attack.

Under my observation several children under one year of age, in apparently good health, have died of convulsions. In one we found at autopsy one-eighth of an orange in the small intestine. In six, the convulsions were due to enlarged thymus glands. In three of these cases there were no previous symptoms of the existence of this condition (page 471). They were strong robust infants. Two of them were breast-fed. The diagnosis was confirmed by autopsy in four, which included the breast-fed.

NIGHT-TERRORS

In night-terrors the child arouses from his sleep frightened, and sometimes imagines that animals or persons are trying to injure him. In a great majority of cases these phenomena are due to a deranged digestion in a neurotic child. The attacks are very liable to follow indulgence in unusual articles of diet, and when they occur repeatedly, it will usually be found that the child is suffering from persistent intestinal indigestion or that the evening meal is habitually beyond his digestive capacity. Children subject to night-terrors should dine at midday. The evening meal should consist of cereals, milk, stale bread and butter, and a small portion of stewed fruit. The patient should never be allowed to go to bed unless an evacuation of the bowels has taken place during the previous twenty-four hours.

Overwork at school and anxiety regarding school duties and lessons are often contributory factors to night-terrors. The cases usually are readily relieved by proper treatment. If the case is an aggravated one, the child should be removed from school, and all exciting play and books of an exciting nature forbidden.

One of my patients, a boy who was four years of age when he first came under my care, has had, during the past five years, two attacks of night-terrors every year. One attack occurs on the night of his birthday and the other on Christmas night. At these times, in spite of my warnings and the repeated attacks, he is indulged by his parents in unsuitable articles of food.

In the very nervous and irritable cases from five to ten grains of bromid of soda may be given at bedtime. This should not be continued longer than a week. If the child is delicate, anemic, or suffering from adenoids, enlarged tonsils, or thread-worms, these conditions, any one of which may contribute to night-terrors, should receive proper treatment.

GYROSPASM—SPASMUS NUTANS

Gyrospasm is a functional nervous affection usually seen in children under one year of age. I have seen one case in a child fourteen

months of age. The disorder consists in a rotatory movement of the head, sometimes from twenty to forty oscillations being made in a minute. The movement may not only be lateral but vertical also, which constitutes what is known as "head-nodding." In one of my patients both the lateral and the vertical movements took place. The oscillations are usually, but not invariably, associated with nystagmus. I have seen a number of these cases in out-patient clinics. Rachitis was present in all. Two of the children were idiots.

The prognosis is good if the patient is mentally normal. It is difficult to state the length of time required before the movements will cease. It is doubtless a matter of several months. With a disorder essentially chronic in character, the improvement is slow. The mother becomes dissatisfied with the treatment and wanders from clinic to clinic with her child. This probably explains in part the large number of individual cases seen by pediatrists. I have had the opportunity to give a few cases a fair trial with sodium bromid—from twelve to eighteen grains daily—a treatment which is generally advocated for this condition, but have failed to note any special benefit from its use. With an increase in age and improvement in nutrition, the cases which I have followed at their homes have gradually improved and recovered.

TETANY

Tetany occurs oftentimes in association with or following exhaustive diseases. It may occur, however, without any such relation to other affections. In my cases there have invariably been rachitis, malnutrition, and intestinal indigestion of a pronounced type. The muscular spasms may involve any portion of the body, but the extremities are most frequently affected.

Treatment.—Inasmuch as intestinal toxemia and malnutrition are the apparent causes of the phenomena, attention directed to the intestinal canal and nutrition is indicated. The child should be given two drams of castor oil, and milk should be excluded from the diet for a day or two until the stools become normal. This treatment alone has cleared up some of my cases. When the spasm persists, bromid of soda should be given in two-grain doses every two hours, giving at least six doses in twenty-four hours, for a child one year of age or younger. The patient should be kept very quiet during an attack, as undue excitement may precipitate an attack of laryngismus stridulus or convulsions which may be of a very serious nature. A hot bath at 110° F. for a few moments, and repeated at six-hour intervals, will often have the desired relaxing effect.

The later treatment consists in regulating the child's nutrition. If the malnutrition is extreme or if the infant is under six

months of age a wet-nurse is the safest means of nutrition. A wet-nurse, however, is not practicable in children beyond one year of age. There is considerable uncertainty as to how these older children, those approaching the twelfth month, will take the breast. When the wet-nurse is impossible or impracticable, an adjustment of the food to the child's digestive capacity is demanded along the lines laid down in the section on Malnutrition.

Not a few of the infants who develop tetany have been on a low proteid such as is furnished by the proprietary foods and condensed milk, or they may have had a low proteid capacity, which, as far as the nutrition is concerned, is practically the same thing. The proteid elements in the diet, therefore, should be kept well in mind in feeding these cases. It is in such cases that peptonized milk (page 119) is indicated. The milk should always be given raw unless the station in life or season of the year forbids it.

When it is possible, children who have had tetany should in every instance be given the advantages furnished by climate. An outdoor life in the country with open windows at night are necessary for rapid relief of the weakened physical condition which underlies the disorder. The patient should be given a brine bath (page 31) at bedtime. It is followed by inunction with an animal fat during the cooler months, goose oil being preferred. As these patients are usually suffering from a secondary anemia, one-half grain of the citrate of iron and ammonium may be given twice or three times daily after feeding. The hygienic and dietetic management of these cases is practically the same as that suggested for marasmus and malnutrition.

CHOREA—ST. VITUS' DANCE

The management of chorea depends entirely upon the degree of severity of the attack. It may be necessary in extreme cases to keep the child in bed from three to four weeks. In other cases, where the attack is milder in character, the enforced rest may do harm. Formerly I treated more cases on the extreme rest plan than I do at present. For cases in which the involuntary movements are so marked as to interfere with locomotion and prevent the child's feeding himself, rest in bed for a week or two is strongly advised. In my observation, it is mental repose which the patients particularly require, and if this can best be obtained in bed, then the bed is the best place for the patient. If an absence of mental excitement and stimulation can be secured with a reasonable amount of outdoor life and exercise, so much the better for the patient. An important feature to be remembered in the management of choreic children is that they must not be allowed to become fatigued either physically or mentally.

In the cases which have been confined to the bed for several

days or weeks, a gradual return to the usual habits is best. The child should be taken up for one-half hour the first day, increasing the time out of bed one-half hour daily, until he returns to his usual habits of life. School for the choreic patient is out of the question, no matter how mild the case. In the great majority of cases, play with other children will have to be interdicted. Books and play of an exciting nature are particularly to be avoided. Specific instructions as to the amount of physical and mental rest required cannot be given so as to apply generally in the management of chorea. The physician should particularly remember that there must be no bodily fatigue and no mental stimulation of any nature whatever. How best to bring this about will depend upon the child and his environment.

In two instances I have been obliged to remove the child from his home and place it among relatives. The influence of the mother was such as hopelessly to prevent the child's recovery. Cases not sufficiently severe for confinement in bed, should be made to rest for two hours every day after dinner.

Strümpell in his text-book states that the association of chorea and rheumatism is so close that it is impossible to separate them. Hirt, in discussing nervous diseases, expresses the view that there is a common toxic etiologic factor which, affecting the cortex, produces chorea; but affecting the joints, gives rise to acute articular rheumatism. That the association of chorea and rheumatism is a most intimate one, has been borne out by the observations of many clinicians. A trifle over 50 percent of my cases of chorea either gave a history of having shown rheumatic manifestations, or they showed evidence of it when first seen. In 80 percent of my cases there was some association with rheumatism, either in rheumatic parents or in the actual manifestations of rheumatism at some time in the patient's life. So impressed have I been by the above facts, and by the similarity of the clinical signs of these supposedly distinct diseases, that I believe them due to the same toxic agent. This is further proved by the results of treatment.

Anti-rheumâtic Treatment.—By treating every case of chorea as though it were rheumatism, my results have been strikingly better. Not only is the child given the salicylates, but he is put on an anti-rheumatic diet—given meat but once every second day, and but little sugar. The salicylate of soda may be given in smaller doses than are used in acute articular rheumatism—about five grains three times daily, with an equal amount of the bicarbonate of soda, being suitable for a child from six to ten years of age, the soda being given between meals. To children of this age the salicylate may be given either in capsule or in solution. In young children, the drugs in solution are more easily administered. During the past year I have given aspirin to a few patients in whom

the digestive functions were weak or who could not take the salicylate of soda. In using the salicylate of soda, Merck's or Squibb's preparation should always be indicated. In using salicylate of soda or aspirin for a considerable time, it is well to remember that they may interfere with the appetite and digestion, no matter how great the care exercised in their use. For this reason it is my custom to give them intermittently—five days of medication being followed by five days of rest.

I have found that by putting the patient on the anti-rheumatic treatment much less arsenic is required, and that the patient usually makes a more prompt recovery. I have never been obliged to resort to the large dosage of twenty-five to thirty drops of Fowler's solution three times a day, as suggested by Seguin. It is exceedingly rare that it is necessary to give more than ten drops three times daily in order to procure satisfactory results. In spite of the value of the anti-rheumatic treatment this alone will not answer, as I have proved to my satisfaction in not a few cases. The administration of the arsenic and the salicylate and the dietetic régime are begun at the same time. The salicylate of soda is given at once at the commencement of the treatment in as full doses as we expect to give it. Arsenic is commenced in small doses, which are gradually increased in order to establish a tolerance of the drug. Fowler's solution of arsenic is usually employed. In order that no error be made in its administration, a table similar to the following is given to the mother or attendant. For a child six years of age on the first day after each meal, two drops should be given as indicated below. Thereafter, the dosage is increased by one drop every twenty-four hours, according to the following schedule:

DOSAGE OF FOWLER'S SOLUTION FOR A CHILD SIX YEARS OLD

1st	day—	Morning,	2	Drops.	Noon,	2	Drops.	Night,	2	Drops
2d	"	"	2	"	"	2	"	"	3	"
3d	"	"	2	"	"	3	"	"	3	"
4th	"	"	3	"	"	3	"	"	3	"

This rate of daily increase is continued up to the third week, after which time the dosage should range from five to ten drops three times a day. For a child of eight to ten years of age the amount may be increased to twelve to fifteen drops three times a day. I have never found it necessary to give more than twelve-drop doses to girls of thirteen to sixteen years old. A very recent aggravated case in a girl fifteen years of age made a complete recovery in three weeks under the above scheme of diet, the use of aspirin, ten grains three times daily after meals, and Fowler's solution up to twelve drops after each meal. With the improvement of the case, the diet should be continued. The medication may gradually be reduced after all the symptoms have disappeared. It should

be continued, however, in from one-third to one-half the quantity, for three weeks after the disappearance of all nervous symptoms.

Supplementary Treatment.—It should be remembered that children who have once had chorea are very susceptible to recurrent attacks. This is also the case with children who have had rheumatism. After one attack of chorea the danger of a return is explained to the mother, who is asked to bring the child for examination at the first suggestion of involuntary muscular twitching. In addition to this, children who have had chorea, as well as those who have had rheumatism, are allowed meat but once every second day, and in no case is an excessive use of sugar permitted. Candy is usually forbidden. Believing that these cases are rheumatic in origin, when the attack is over I order the child to receive ten grains of bicarbonate of soda daily for five days out of every fifteen. In this way, with a reasonably quiet home life and no school contests for prizes, etc., a recurrence will in all probability be prevented. In giving arsenic, mothers are advised that in the event of abdominal pain, diarrhea, coated tongue, foul breath, vomiting, or puffiness under the eyes, the drug is to be discontinued for at least two days. Upon resuming it, the minimum dose is again given with the same gradual increase.

Children vary greatly as to their tolerance of arsenic. A boy seven years old, under my care at the present time, cannot take more than four drops of Fowler's solution three times a day.

HABIT SPASM—TIC[1]

By habit spasm we understand a semi-incoördinate movement of some portion of the body. The term "semi-incoördinate" is used advisedly, because the spasm may be controlled when the child's attention is directed to it, this being one of its distinguishing features. The muscles involved in the spasm are usually those of the head, face, or arm. The nose may be drawn up, the chin down, or the head to either side. The muscular spasm is worse when the patient is tired and occurs more frequently under excitement. While these children cannot be said to have chorea, there is a close association of the two conditions, there being but a step from habit spasm to true chorea. Habit spasm is most frequently seen in those of rheumatic inheritance—those who have had previous attacks of chorea or rheumatism or the respiratory manifestations so frequently seen in children of the rheumatic type.

Treatment.—The management is dietetic, hygienic, and medicinal. I allow these patients a small portion of red meat once a day. Sugar is given in sufficient amount to make the food pala-

[1] Dr. Edward Wheeler Scripture, in his treatment of ties, has his patients stand in front of a mirror and imitate the tic, thus converting it from an involuntary to a volitional one. By this means he shows surprisingly prompt and favorable results, especially when the tic is of recent contraction.

table. The vegetable and legume element in the diet is made prominent. The patient will usually be found poorly nourished, often he is suffering from a secondary anemia, so that a diet best calculated to improve his general condition should be prescribed. He should be given a salt bath (page 31) at bedtime, followed by an oil rub—one ounce of goose oil, unsalted lard, or olive oil being rubbed into the skin immediately after the bath.

Temporary absence from school or a lightening of school duties and an outdoor life are of much aid in the successful management of a case. The child should not be allowed to do anything of a strenuous nature. Hard play and any amusements of an exciting character are to be forbidden. Fatigue must be avoided. Rest after the noon-day meal for an hour or two is strongly recommended.

As to medication, the scheme suggested for chorea is also applicable here. If there is anemia, iron is given, preferably in the form of the extractum ferri pomatum, $\frac{1}{3}$ grain three times a day. In those children who cannot take cream or butter, cod-liver oil in teaspoonful doses is a valuable addition to the treatment. The iron may be alternated with the cod-liver oil, each being given for five days. If there is a rheumatic history or inheritance, aspirin or salicylate of soda, preferably aspirin, is given in capsule with the iron. The following is a favorite prescription for a child five years of age:

℞. Liquoris potassii arsenitis.....gtt. iij
Extracti ferri pomatum.....gr. ss
Aspirin.....gr. iij
Sig.—One dose; to be given in capsule after each meal.

The use of arsenic, while of advantage, does not appear to be as valuable here as in chorea.

Habit spasm being practically under the control of the will, should be strictly forbidden, rewards being given and punishments imposed, as seem to answer best.

EPILEPSY

While the underlying conditions as regards the pathology and etiology of epilepsy are better understood as a result of the study which has been devoted to the subject during the past few years, our knowledge as to the successful treatment of the disease has not increased materially, if we are to judge from the recent writings of the best authors. While appreciating the value of workers in this field, I am sure that there is a disposition on the part of some writers to draw too narrow lines of differentiation between different types of the disease.

Treatment.—In the management of epilepsy we can promise little or nothing as to cure, and practically all we can hope to do is to diminish the frequency of the attacks which characterize the disease, whether it be a grand mal or a petit mal. Proper nutrition,

rational habits of living, and pleasant outdoor occupations are of inestimable service in the management of the epileptic. The method of management which has served me best has been, first, along general and hygienic lines; and, second, by the use of drugs. It should be our object to make the patient physically as normal, as vigorous, and as resistant to attacks as lies in our power.

Visual defects, enlarged tonsils, adenoids, phimosis, and irritant skin lesions must all be corrected before beneficial results are to be expected from any line of treatment. The patient is then placed under the best possible environment permitted by his station in life. Outdoor life, sports, and games are encouraged, always keeping within the lines of moderation. The child should sleep in a cool room with the freest possible ventilation at all seasons of the year. If he is a school-child, he is instructed at home and the sessions are made short and the studies easy. The patient in his work or play is never allowed to reach the point of mental or physical fatigue. This, to my mind, is most important. Emotional plays at the theater and exciting amusements elsewhere are forbidden.

The diet is to be adjusted to the child's digestive capacity. A diet suitable for his age is given, just as for normal children (page 134), meat being allowed only once a day. As intestinal indigestion and toxemias from intestinal sources are unquestionably important etiologic factors in not a few cases in causing a recurrence of the seizures, careful attention to the bowel function and diet are most important features of the treatment. The epileptic patient under my care is never allowed to pass over twenty-four hours without an evacuation of the bowels, and if, in the opinion of those in charge, it is not as copious as usual, an enema is given. If there is a suggestion of constipation, the treatment with the oil enemata, as recommended for chronic constipation (page 178), is instituted. In cases in which heredity and toxic influences prevail, the importance of attention to the diet and habits of life cannot be overestimated. When there is a focal lesion, attention to the details of living will have less influence, but always surely some influence, in diminishing the frequency and severity of the seizures by establishing a more vigorous physical resistance.

Among those who are unable to give the patient suitable attention at home I urge that he be placed in one of the excellent institutions devoted to the care of epileptics. The colony management offers advantages that cannot be secured elsewhere. Here the whole manner of life is adjusted and regulated with one object in view.

There are few drugs in the pharmacopeia, particularly those of a sedative nature, that have not been used at one time or another in the treatment of epilepsy. The bromids unquestionably

serve our purpose in controlling the seizures better than does any other form of medication. The size of the dose is variable. Because of their peculiarly depressing effects upon the child's mental condition, the bromids should be given in as small quantities as are compatible with the beneficial results desired—a diminution of the number of the convulsions. Ordinarily ten grains of sodium bromid may be given, well diluted, in one-half glass of water after meals, to a child ten years old, the amount to be increased or diminished as the progress of the case demands. If the convulsions are nocturnal, large doses—from twenty to thirty grains—should be given at bedtime to a child of ten years. In the event of the drug being discontinued to the point where it is given but once a day, the time selected should be bedtime. With continued improvement under the bromid, it may be given on alternate nights, and then every fourth night.

Illustrative Case.—I have now under my care a case which I have treated for several years and which promises well. The first convulsion occurred at the fifteenth year. It was a typical nocturnal seizure. Fifteen grains of bromid with five drops of the tincture of belladonna were given three times daily for three months, when the amount was reduced to thirty grains daily. This was continued for one month, when a death occurred in the family which doubtless helped to incite a second attack. At this time, the patellar reflex being scarcely perceptible and the bromid rash considerable, the drug was discontinued. At the end of two months the daily dosage was placed at twenty grains, with ten drops of the tincture of belladonna. This was continued for four weeks, when there was a third attack, without any apparent cause of an exciting nature, but the patient had allowed herself to become obstinately constipated. This was her last attack. Three years have since intervened. The bromid has been gradually reduced, first to ten grains daily at bedtime, then every other day, and now it is taken every fourth day only.

ACUTE SIMPLE MENINGITIS

The Management of Acute Simple Meningitis.—This form of meningitis is almost always secondary to disease elsewhere, and may be due to many different kinds of micro-organisms, the most usual being the pneumococcus, streptococcus, staphylococcus, and colon bacillus. The most one can do in acute simple meningitis is to nourish the patient and lessen his discomfort. Proved cases rarely recover. We have no means of treatment that may be considered curative in any sense. By the use of repeated lumbar puncture we can in some cases make the patient more comfortable and perhaps aid him to resist the infection. The pulse and the respiration improve as well as the urgency of the nervous phenomena; the

opisthotonos and the excessive hyperesthesia may be temporarily relieved. There is no rational ground for expecting the withdrawal of the cerebrospinal fluid to be curative, neither may the injection of disinfectant drugs into the canal be expected to aid in controlling the disease.

Lumbar Puncture.—Lumbar puncture (page 396) may be practiced as frequently as once in twenty-four hours, the frequency of its use depending, of course, upon the condition of the patient and the relief afforded. Its more frequent use than once in twenty-four hours, as has been suggested by some writers, is not, however, to be advised. The amount of fluid withdrawn depends upon the pressure in the canal as indicated by the passage of fluid through the canula, from one to three ounces being the usual amount withdrawn. The usual surgical precautions as regards asepsis should be observed in performing the operation. One dram of aristol in one ounce of collodion, applied with a camel's-hair brush, makes a suitable protective dressing after the withdrawal of the canula.

Warm Packs.—The warm pack or warm bath at 105° F., by lessening the cerebral blood-pressure, may also assist in relieving the more active nervous manifestations. If the bath is used, the child should not be kept in it longer than three minutes. I usually prefer the hot pack. A large bath towel or medium-weight flannel sheet is wrung out of water at 110° F. and wrapped around the child's body from the waist down. This is repeated at half-hour intervals for three hours, when, after a period of rest for an hour or two, the packs may be resumed.

Diet.—The proper nutrition of the patient with meningitis is oftentimes a matter of no little difficulty. The child may either refuse the food or he may be unable to swallow. Nutrition by means of the rectum or colon may be of assistance for a few days, but it cannot be relied upon for long periods. The parts become intolerant and the nutrient enemata are expelled. Feeding by means of gavage is always to be employed when other means fail. The younger the child, the greater will be our success with it. The feeding should not be attempted oftener than at four-hour intervals; usually every six hours suffices. Completely peptonized full milk (page 120) is usually given in quantities suitable for the age. After a few trials of gavage, the patient may take the nourishment by the usual method or the gavage may be kept up indefinitely.

Sedatives.—Sedatives may be employed with a view to saving the strength of the patient. Morphin, codein, the bromid of soda, or chloral may be given. As morphin and codein increase the usual existing constipation, their use should be very temporary. The bromid of soda for these cases, which may require the protracted administration of a sedative, answers better than any other form of medication. For an infant under eighteen months of age, from two

to four grains may be given at intervals of two to three hours, according to the results. In case the nervous symptoms are very urgent, one-half to one grain of chloral may be added. Should administration by mouth be impracticable, the sedative may be given by rectum, and should be introduced by means of a rectal tube inserted at least nine inches. In using the bromid and chloral in this way, twice the amount of chloral and thrice the amount of bromid should be given that is employed in stomach administration. After the eighteenth month, from one to two grains of chloral and from four to eight grains of the bromid may be given by stomach. It should be well diluted and repeated as often as may be necessary. In case it is to be given by rectum, it should be diluted with at least four ounces of water, and proportionately more given, as suggested for younger children.

The duration of illness of this type of meningitis is rarely longer than two weeks. Following as it does diseased processes elsewhere, it usually finds the child with very little resistance to offer the fresh invasion.

CEREBROSPINAL MENINGITIS

When the medical history of the nineteenth century is written, the years of 1907 and 1908 will stand out prominently as marking the epoch when cerebrospinal meningitis first felt the master hand. Until within a few months we have stood as helplessly by the bedside of a patient ill with cerebrospinal meningitis as we now do beside the tuberculous form. To the genius of Dr. Simon Flexner is due the elaboration of a serum which shows results in the treatment of this disease which, to say the least, are most gratifying. Dr. Flexner, in the *Journal of the American Medical Association*, vol. li., No. 4, presents an analysis of 400 cases treated with antimeningitis serum. The serum is prepared in the horse by inoculations of the diplococcus intracellularis and its products.

In the 400 cases the diagnosis had been established by bacteriologic examinations. In arranging the records or the observations account was taken of the age of each patient, the period of the disease when the serum was first injected, the number of injections made, the dosage of the serum, the effects on the temperature, and the subjective and objective symptoms of the disease, on the number and viability of the diplococci in the spinal exudation, the general leukocytes, the duration of the fever, and the manner of recovery, whether by crisis or by lysis. All cases which survived the first dose of the serum less than twenty-four hours were excluded, as marked beneficial effects could not be expected in so short a period.

Results According to Age of Patient.—Total number tabulated, 393. Recoveries, 295. Deaths, 98. Seventy-five percent recovered and in 25 percent the issue was fatal. In the following table Dr.

Flexner gives the relation between the recoveries and the ages of the patients:

Patients.	Total number.	Recovered.	Died.	Percent of deaths.
Under 1 year	22	11	11	50.0
Between 1 and 2 years	19	11	8	42.1
Between 2 and 5 years	68	52	16	23.5
Between 5 and 10 years	79	70	9	11.4
Between 10 and 20 years	105	80	25	23.8
Over 20 years	87	64	23	26.4
Age not given	13	7	6	46.1

Results According to Period of Injection.—Among 328 cases the histories were sufficiently explicit to make it possible to approximate the period in which the first serum injection was made:

Period of injection of serum.	Number of patients.	Recovered.	Died.	Percent of deaths.
First to third day	121	103	18	14.9
Fourth to seventh day	100	78	22	22.0
Later than seventh day	107	68	39	36.4

It would seem from the table that while the cases injected early have the best opportunity for recovery, nevertheless, as some were injected after days and weeks of illness, it would appear that the usefulness of the serum did not cease as long as the diplococcus was present in the cerebrospinal fluid.

Manner of Termination.—In 270 cases Dr. Flexner was able to determine whether the termination was by lysis or crisis; 201 terminated by lysis and 69 by crisis.

Influence on Diplococcus, Spinal Exudate and Leukocytosis.—Soon after the injection of the serum was made, the diplococci became greatly reduced in number and wholly intracellular; they tended to disappear all together, to present changes in appearance, as swelling and fragmentation, to stain diffusely and indistinctly, and to lose mobility in cultures. In those with turbid and purulent exudates a rapid clearing occurred in some. Together with the clearing of the spinal fluid and the loss of pus cells is associated the return of the circulating leukocytes to the normal.

Counts made before and after the injections often demonstrated a critical fall in the number of leukocytes in the blood-stream. Unfavorable indications were a continuation of the leukocytosis, the turbidity of the exudate, and the persistence of the diplococcus after the serum injections.

In the *Journal of the American Medical Association*, vol. li., No. 1, Dr. Charles Hunter Dunn gives an analysis of 40 consecutive cases of cerebrospinal meningitis treated by Flexner's serum.

In all the diplococcus intracellularis was found in the cerebropinal fluid. Dr. Dunn's method was to make a lumbar puncture in every suspected case. If the cerebrospinal fluid was cloudy, the antiserum was used at once without waiting for a bacteriologic examination.

If the fluid was clear, no antiserum was given until subsequent examination revealed the presence of the meningococcus.

In cases in which other organisms, such as streptococcus or pneumococcus, were found in association with the meningococcus, the serum was not repeated, but in the cases showing multiple infection in which it was used no apparent harm resulted.

In the cases in which a rapid and marked improvement occurred after the first injection, accompanied by a permanent fall of temperature to the normal, no further injection was given. In cases in which this did not occur, the injections were repeated daily until the nervous and subjective symptoms were completely relieved and the temperature had reached the normal or until four doses had been given. In resistent or relapsing cases further doses were given. Dr. Dunn's routine dose was 30 cc., the largest dose given was 45 cc.

In instances where the amount of fluid obtained was small, and in all instances where too great an increase of intradural pressure was feared, smaller amounts were injected, the minimum being 10 cc.

Of the patients treated by Dr. Dunn, nine died and thirty-one recovered. A mortality of 22.5 percent. This, it will be seen, corresponds with the mortality of Dr. Flexner's cases. Among the patients who recovered one was deaf, and another blind and deaf. The recovery was complete in 72.5 cases.

Effects of the Serum.—According to Dr. Dunn, the three principle effects of the serum were, first, to produce a fall of the temperature; second, to produce a rapid improvement in the patient's general condition, accompanied by a more or less marked relief of certain symptoms, and third, to cut short the disease.

The effects on the symptoms and general condition is the most striking phenomenon observed in the use of the serum. In some there occurred a permanent return to consciousness, a disappearance of mental dulness and delirium, of headache, hyperesthesia, tenderness of the neck, and vomiting. These symptoms, according to Dr. Dunn, were relieved in twenty-four hours after the first injection, the patient changing in a remarkable way from a serious condition of coma to a favorable condition of normal mental activity.

In other cases the improvement occurred more slowly, and in others, the late chronic cases, no effects were noticed. The rigidity of the neck and Kernig's sign were the most persistent, so that at times patients remained normal in every way, playing with other children in the wards while these signs persisted.

Effects on the Cerebrospinal Fluid.—Successive examinations of the cerebrospinal fluid twenty-four hours after the injection showed a striking change in the character of the contents. The number of organisms seen is much smaller, the chief change being that the majority are intracellular. In the fourth fluid, after three doses, there are frequently no diplococci to be found.

Relapse occurred in seven of Dr. Dunn's cases, and each relapsing case responded to one dose of serum.

Early Use of Serum Important.—The earlier the serum was used, the more marked its effects. In five the disease was suddenly aborted after one dose of serum, recovery being complete. In seventeen there was a rapid and permanent improvement. In twelve of these the serum was given in the first week, in three in the second week, and to one in the third week. In eight the serum had no marked effect. Of these, three were in the first week, the other five being late chronic cases.

One patient in the late chronic stage began to improve after one dose of the serum and made a rapid convalescence. This would indicate that improvement is always possible in the presence of diplococci.

Dr. F. S. Churchill[1] reports nine proved cases treated with the Flexner serum, with two deaths; one of these was of the fulminating type, the other entered the hospital moribund on the tenth day. Temperature, cerebrospinal fluid, and leukocyte effects were practically the same as offered by Dr. Flexner and Dr. Dunn and need not be repeated.

In closing, Dr. Churchill remarks: "As one watches the behavior of these patients after one, two, or three injections of this serum, he is impressed with the astonishing change which comes over them, the clearing mentality, the unsuffering expression of countenance, the evident comfort, even with a still retracted head and rigid muscles, and he is filled with an optimism as to the ultimate result which perhaps is not yet justified."

Method of Use.—The method of procedure in using the serum is to withdraw by means of lumbar puncture at least 20 to 30 cc. of the cerebrospinal fluid. The barrel of the syringe, loaded with the antimeningitis serum, is then screwed to the needle or canula which was used for the tapping and the serum forced into the spinal canal. One injection every twenty-four hours is advised until four have been given. If the case prove resistant or if there is a tendency to relapse, the treatment is to be repeated.

TUBERCULAR MENINGITIS

This disease offers us one of the most hopeless conditions we may be called upon to treat. I have never known a proved case to recover. Lumbar puncture (page 396) and withdrawal of the cerebrospinal fluid is useful here for diagnostic purposes and for relieving pressure symptoms, which are often most distressing. All that we can hope to do is to make the patient comfortable and supply nutrition. Children ill with this disease rarely die under two weeks or live longer than six weeks after the appearance of diagnostic signs.

The details of management as to baths, packs, nutrition, and

[1] *Journal of American Medical Association*, vol. li., No. 1.

medication are exactly the same as those used for Acute Simple Meningitis, and will be found on page 391.

LUMBAR PUNCTURE

The site selected for lumbar puncture is a point parallel with the crests of the ilia and between the spinous processes of the third and fourth lumbar vertebræ. The child should rest on its side (see Fig. 43), sufficient pressure being exerted on the buttocks to make the spinous processes prominent. The Quincke needle (Fig. 44) should always be used in making the puncture. The stylet which fits the beveled edge of the point of the needle effect-

Fig. 43.—Position for and Site of Lumbar Puncture.

ually prevents its being plugged. The skin for several inches about the site of the puncture should be scrubbed with the tincture of green soap and alcohol. The physician's hands should be thoroughly disinfected. Considerable force may be necessary in order to enter

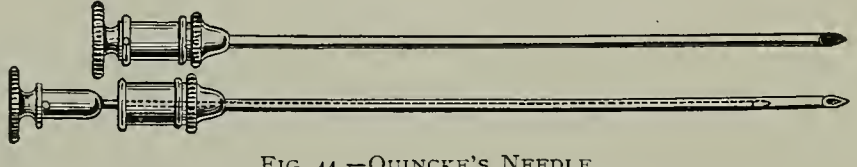


Fig. 44.—Quincke's Needle.

the canal. When there is a sudden giving way of the obstruction to the progress of the needle, we know that the canal has been entered. The puncture may be made in a line with the spinous processes or from the side, the needle being passed between the laminæ. When the point of the needle has been introduced into the spinal canal, the stylet is withdrawn. The cerebrospinal fluid may escape with force in a stream as a result of the pressure or it

may exude drop by drop. A sterile tube should be in readiness in order to collect the fluid for examination.

Lumbar puncture is often of value for diagnostic purposes, but its therapeutic value is practically *nil*. In meningitis the withdrawal of an ounce or two of the fluid will sometimes furnish temporary relief to the patient. The retraction of the head and the spasticity will generally be relieved for a time. I have repeatedly withdrawn the fluid in such cases, where there was a tense bulging of the fontanel, and after two or three hours have passed, the fontanel would still be found depressed; it would soon become prominent, however, and in eight or ten hours it often would be as tense as before. The advantage of lumbar puncture, therefore, is largely of a diagnostic nature, only temporary relief being furnished the patient by the operation. The introduction of drugs into the canal for bactericidal purposes is valueless.

CHRONIC INTERNAL HYDROCEPHALUS

When hydrocephalus in infants is mentioned without definite qualifications, the *internal* is always the type referred to, the *external* being of extreme rarity. The discussion of this affection will necessarily be brief, for after the treatment of a considerable number of such cases in hospitals and institutions I am unable to recommend any treatment that has proved of the slightest value.

A new operative measure is now being employed by Dr. A. S. Taylor, of New York, which consists in tapping one of the lateral ventricles and establishing drainage by means of strands of chromicized catgut conducting the fluid to the subarachnoid space, where its absorption is hoped for. The operation is described by Dr. Taylor as follows:

"An osteoplastic flap about two inches in diameter is turned down, with its hinge over the base of the mastoid and just above the level of the horizontal lateral sinus. In the lower part of the dura mater thus exposed, a semicircular flap, base downward and about one inch in diameter, is made. Frequently there are one or two distended veins beneath this dural flap, and they should not be damaged, for their walls are so friable that neither clamp nor ligature is of much use, and the bleeding is annoying. The brain immediately protrudes through this dural window. A slender aspirating needle is passed through the second temporo-sphenoidal convolution (which is the one protruding), inward and slightly upward until it enters the ventricle, when the clear fluid spurts out and is collected in a sterile tube for bacteriologic examination. Only a very small amount should be allowed to escape in this way.

"The thickness of the brain tissue is measured by observing the length of needle inserted when the fluid begins to escape.

"The drain is now made of No. 2, forty-day, chromic catgut. Three loops (six strands), about an inch and three-quarters longer

than the thickness of the brain, are bound together by a loose spiral of catgut, starting at one end and stopping so as to leave an inch and a quarter of the loops free. In other words, the drain consists of a shaft of six strands of catgut a half-inch longer than the brain thickness, and spreading from its base, three free loops of gut an inch and a quarter long. Around the shaft of the drain, but not covering its tip, are rolled three layers of cargile membrane. With a long, narrow-bladed thumb forceps the tip of the drain is seized and carried into the ventricle along the tract made by the aspirating needle. The tip projects about one-half inch into the ventricle. The free loops of gut are slipped under the dura, between it and the brain surface, in different directions, but chiefly downward toward the great lymph spaces at the base of the brain. A sheet of cargile membrane is slipped between the dura and the catgut loops to prevent adhesions. Usually by this time sufficient ventricular fluid has escaped, so that the brain no longer protrudes through the dural window. The dura is sutured with catgut, the bone-flap is held in place by three or four chromic catgut sutures, the deeper soft tissues by catgut, and finally the skin with silk. A good-sized sterile dressing is applied with some pressure.

"The site just above and behind the ear, with the puncture through the second temporo-sphenoidal convolution, was chosen because the body of the lateral ventricle is drained. Where anomalies of the ventricles exist they most frequently involve one or the other of the horns. Afterward, moreover, the escaping fluid leaves the brain in close proximity to the great lymph spaces and venous sinuses at its base—a fact which favors its rapid absorption. The right side of the brain is chosen because, if any irritation of the motor areas occurs, the left side of the body is involved, and more particularly Broca's speech center is not disturbed, as it lies in the left hemisphere. The approach to the brain is easy; the brain need not be handled, and is but slightly injured in the insertion of the drain."

ACUTE ANTERIOR POLIOMYELITIS—INFANTILE PARALYSIS

In poliomyelitis we meet a disease by which we are singularly handicapped. Prophylaxis amounts to nothing. The strong and the well are as frequently attacked as the delicate—perhaps more frequently. The recent severe epidemic (1907) through which we have passed has added nothing to our knowledge as to the management of this disease. We have had it demonstrated that many mild cases make a complete recovery. This took place in five out of thirty-eight cases which came under my observation. These did not recover, however, as a result of treatment. They recovered because the infection in them was mild.

Treatment.—During the acute stage of the involvement of the cord our efforts count for little. We order that the child be kept quiet in bed, that a laxative be given, and that he receive light, easily

digested nourishment, and then, as far as the immediate conditions are concerned, we have done our little, but our all. I have used the bromids and ergot and the iodids internally, and ice-bags and blisters over the spine at the site of the lesion, and am yet to be convinced that they are worthy the annoyance which they cause the patient or that the drugs are worth the indigestion they are apt to occasion. That the disease is due to an infection is probable, and in a given case our hope must be that the infection will be mild in character. The degree of involvement determines the resulting atrophy and loss of function.

Later Treatment.—From ten days to two weeks after the acute stage has passed our efforts should be directed toward maintaining the nutrition of the affected muscle or groups of muscles. This is to be done by mechanical means, electricity, and gymnastic exercises (page 569).

The beneficial action of electricity consists largely in exercising the muscles no longer under voluntary control, and thus increasing their circulation and nutrition. The immediate object of the electricity is to induce contraction of the muscles. Either the faradic or the galvanic current may be used. The faradic should first be tried, and if to this there is no response, the galvanic should be used. Sittings of from five to fifteen minutes may be desirable, depending somewhat upon the age of the child and the age and extent of the lesion. The longer the duration of the disease, the longer should be the sittings. Once daily the parts should be massaged by one skilled in the work. When this is not available the mother or nurse may undertake with some advantage the systematic manipulation of the affected muscles by kneading and rubbing. The further management is orthopedic, and consists in the *prevention* of deformities by the use of splints and braces or their correction by tenotomies and tendon transplantation.

DIPHTHERITIC PARALYSIS

Every child with diphtheria should be watched and treated as if diphtheritic paralysis were expected. It has occurred, to some extent, in 9 percent of my cases. The first sign of irregularity of the pulse calls for an enforced recumbent position and the use of strychnin. If marked irregularity of the heart action occurs early in an attack of diphtheria, myocarditis may be suspected, a condition which calls for as active measures of treatment as does the irregularity which may occur later, from the tenth day to the third week of convalescence, which usually means nerve involvement. The two conditions may occur in the same individual.

The soft palate and the muscles of deglutition are most frequently involved. There may be paralysis of the pharynx and larynx. Next in frequency the muscles of the extremities are affected. It has been my experience that if the heart is to be attacked, signs

indicating it will be noticed early—soon after the paralysis of other parts is apparent—or it may be the earliest symptom, the first warning being the heart's irregularity, which may be the only evidence of its involvement.

Treatment.—If after ten days from the onset of throat paralysis, or paralysis elsewhere, there is no evidence of cardiac involvement, it will be unusual for it to develop later, although this is by no means certain. Should it occur, absolute rest in the recumbent position is important. The patient should be constantly under the eye of an attendant. He must not be allowed to turn over in bed or to raise his head without assistance. A hypodermic syringe loaded with $\frac{1}{100}$ grain of strychnin and $\frac{1}{200}$ grain digitalin should be in constant readiness. Strychnin should be given these patients throughout the entire illness and well on into convalescence. In these cases we rarely have to deal with children under eighteen months of age, my youngest case of diphtheritic paralysis being fifteen months old, so that in the consideration of doses only children over one year of age will be referred to. For a child from one to two years old, $\frac{1}{300}$ grain of strychnin may be given at three-hour intervals; from two to four years of age, from $\frac{1}{200}$ to $\frac{1}{150}$ grain at three-hour intervals. After the fourth year, $\frac{1}{150}$ to $\frac{1}{100}$ grain may be given at three-hour intervals. When there is marked rapidity of the heart's action with irregularity and restlessness in those under three years of age, from one to two drops of tincture of strophanthus may be given with $\frac{1}{15}$ to $\frac{1}{10}$ grain of codein, and repeated at two-hour intervals. After this age one and one-half to three drops may be given with $\frac{1}{10}$ to $\frac{1}{6}$ grain of codein at two-hour intervals. The codein is to be discontinued as soon as the restlessness ceases. For those in whom there is simply paralysis of the muscles of deglutition or of the extremities, small doses of strychnin will be all the medication required, from $\frac{1}{300}$ to $\frac{1}{200}$ grain three times daily being sufficient. Troublesome features in the management of cases in which there is marked involvement of the palate, the pharynx, and the larynx, consist in the difficulty of feeding the patient and in the danger of aspirating food and mucus as a result of the paralysis. The tendency of diphtheritic paralysis is toward recovery, the time required being usually from four to eight weeks.

Illustrative Cases.—A boy six years of age had a very mild attack of diphtheria, not of sufficient severity to necessitate his remaining in bed. Two weeks after the attack, the time of his coming under my care, there was marked paralysis of the soft palate and pharynx which rendered swallowing most difficult. In spite of energetic treatment with strychnin hypodermatically, the paralysis soon involved the larynx, the masseters, and the muscles of all the extremities. Fortunately the heart or diaphragm was not involved. There was a constant flow of saliva which at times entered

the trachea unimpeded, causing severe paroxysms of coughing. In order to prevent this, the legs and trunk were elevated, the head being made the most dependent portion of the body. Swallowing was impossible and he was given by gavage every six hours as indicated completely peptonized milk, whisky, beaten egg, and strychnin. The boy made a complete recovery, but it required three months to accomplish it. In another patient, fifteen months of age, gavage was practised at six-hour intervals for five days, when solids could be swallowed.

Gavage (page 140) is but little objected to by children after it has been used once or twice. It should be employed as soon as it is shown that enough nourishment cannot be taken by the natural means. If coughing results in attempts at swallowing, it means that the larynx is involved and that feeding by the usual means should not be attempted. Nutrition by means of the bowel may be brought into use, but it is not necessary unless there is cardiac paralysis, in which event the resistance of the patient might enter as a factor making gavage dangerous. Attempts at swallowing may be made from time to time. Semisolid substances, such as scraped beef and soft-boiled egg, will usually be better managed than fluids, because of the tendency of fluids to pass through the glottis.

MULTIPLE NEURITIS

Neuritis of this nature, aside from that following diphtheria, is not of as rare occurrence in children as is claimed by some authors.

The disease may be due to various toxic agents through their specific action in producing an acute inflammation and degeneration of the peripheral nerves. Among the possible causes are malaria, the exanthemata, grippe, pneumonia, and typhoid fever. Lead, phosphorus, arsenic, and alcohol as possible causes are also to be kept in mind. Lead is a very unusual cause. Arsenic, phosphorus, and alcohol, however, are used extensively as therapeutic agents during child-life, and should always be considered as possible etiologic factors.

I recently saw two pronounced cases in two brothers following very severe scarlet fever. Many mild cases of neuritis in children, following exhaustive diseases with prolonged toxemia, are doubtless overlooked, the prolonged time required for the return of muscle power in the arms and legs after such diseases being attributed solely to muscle weakness. Sensory disturbances in children are not such prominent symptoms as the neurologist would have us believe, for the reason, possibly, that he usually sees only the more severe cases. The mild cases seldom come under his care. I have seen quite a number of the mild cases in which there were sensory disturbances and a diminished patellar reflex following lobar pneumonia with high temperature, and also after severe scarlet fever.

Treatment.—The management is largely palliative, there being a strong tendency to spontaneous recovery in from four to eight weeks from the onset. Exciting causes, such as the use of alcohol or some other drug, should, of course, be eliminated, when recovery usually follows. In those cases due to the toxemia of preceding disease, time and good care are usually all that will be required to effect a cure. If pain is present the best means of relief is the use of heat, the affected limb being bound in thick layers of cotton-wool. The salicylate of soda and iodid of potash are not to be given to young children. They produce no appreciable effect, except possibly a disturbance of digestion and a lessening of the appetite. Should the pain be sufficient to interfere with sleep, bromid of soda may be given in doses of from eight to twelve grains, for a child of from five to ten years of age, at bedtime and repeated but once. In using hypnotics in children, one drug should not be continued longer than three days.

Codein is a satisfactory sedative for a child in case the bromid does not answer. For patients from five to ten years old, from one-tenth to one-sixth grain may be given at bedtime and repeated once after an interval of three hours.

As a tonic I know of no better combination of drugs for a child with neuritis than the following, for a patient from five to ten years of age:

℞. Strychninæ sulphatis.....gr. ¼
Extracti ferri pomati.....gr. x
Quininæ bisulphatis.....℥j
M. et ft. capsulæ No. xxx.
Sig.—One after each meal.

If constipation is present or should result from the administration of iron, from one-third to one-half grain of extract of cascara may be added to each capsule. The capsules are given for ten days, followed by cod-liver oil for five days. The oil is given after meals. At the end of five days the tonic capsules are repeated, to be followed again by the oil. The patient should have the benefit of an outdoor life as early as possible. Electricity has not been necessary in my cases, neither has the use of orthopedic appliances been required. Massage may be used with advantage after the subsidence of the acute symptoms. It should be given by one skilled in the work.

FACIAL PARALYSIS

Paralysis of the facial nerve is not of infrequent occurrence in the young. It may result from forceps pressure at birth or from pressure exerted by the bony parts of the pelvic outlet. In later infancy or childhood it may be the result of trauma caused by operative manipulations; it may be of rheumatic origin; it may be due to cerebellar disease, or to exposure to cold. In one of

my patients it was attributed to sitting by an open window in a railroad car on a cold day. The nerve in its outward passage through the fallopian canal may become diseased from the presence of a purulent otitis media. This is probably the most frequent cause of the paralysis.

Treatment.—The management depends entirely upon the cause of the paralysis. If due to cerebral disease, but little is to be expected from treatment. If due to an otitis media, surgical procedures, such as establishing a free drainage to the cavity of the middle ear, to be followed by frequent hot irrigations, should be resorted to. If these are ineffective, the mastoid should be opened and the cavity drained posteriorly. Where the functional activity of the nerve is delayed, electricity may be brought into use, as is indicated below. Cases in which rheumatism is supposed to be a factor should be given the benefit of anti-rheumatic treatment by the use of the salicylates (page 489). If the case is due to cold or trauma there is a strong tendency toward recovery, without treatment. It is difficult to judge of the value of such a therapeutic measure as electricity; but the effect of exercising the paralyzed muscles and stimulating nerve conduction by its use must be of some service. If the electricity is used, five-minute daily sittings are all that are necessary, using the faradic current if it produces sufficient reaction. If not, the interrupted galvanic current should be employed.

CEREBRAL PALSIES

Three types of this affection are recognized by neurologists, the *pre-natal*, the *birth*, and the *post-natal*.

Concerning the etiology of the pre-natal cases, considerable confusion and varying opinions exist. Degeneracy of the parents, alcoholism, syphilis, and trauma are supposed to be contributory causes. I have seen a large number of these undoubtedly pre-natal cases, and am unable to add anything from the etiologic standpoint. In several instances the patients have belonged to families of several children each, the other children being normal, with nothing worthy of note in the family history and with a normal, uneventful pregnancy.

Trauma at birth, whether due to the use of forceps or to compression of the head in a prolonged or abnormal delivery, may result in meningeal hemorrhages causing an immense number of cases of cerebral palsy. The obstetrician should always keep in mind that with him rests the possibility of making a hopeless invalid or an idiot of the child he is about to deliver. It is fully appreciated that under unusual conditions in obstetric practice certain risks of head injury must be taken for the sake of the immediate demands of the mother or the child, but the large number of cases of cerebral palsy and idiocy which I have seen have impressed

upon me the necessity of treating the child's head during delivery with the utmost care.

The pre-natal and birth palsies are often paraplegias or diplegias, and as such show a wide distribution of the lesions. In the post-natal or the acquired cases there is more apt to be a hemiplegia, the hemorrhages usually resulting either from blows, falls, convulsions, or infectious processes. A comparatively trifling injury is sometimes sufficient to produce a hemorrhage.

Illustrative Cases.—A five-year-old boy, a pronounced hemiplegic with normal mentality, owes his present condition to a fall from his baby-carriage to the ground when nine months of age. The fall was followed by repeated convulsions and hemiplegia. He came under my care a few days after the fall. The clot was located, the skull trephined, the blood-clot removed, and the bleeding vessel ligated. The boy today walks well with a brace and will be able to discard it in a few years; the arm will probably never be of much service.

Another child, fourteen months of age, was perfectly normal previous to an acute attack of indigestion with high fever and convulsions. The seizures were repeated several times during the day. After the third convulsion, it was noticed that there was complete paralysis of the left side of the face and of the right arm and leg. The child died thirteen months afterward. His mental condition never cleared—he remained an idiot until death.

Treatment.—The medical treatment of these cases of paralysis consists in maintaining a high degree of nutrition. Drugs are of no service. The management in general in the different types of cases varies, depending upon the intelligence of the patient, the location and extent of the paralysis, and the resulting deformity. Braces are necessary in many cases to prevent contractions and deformities or to aid in correcting those already present. In some of my cases of normal or fair mentality marked improvement has followed daily systematic manipulations and exercises (page 569) under the management of an expert in this line of work.

A description of operative measures and a discussion of the cases in which they are applicable may be found in all works on orthopedics. Systematic exercise, massage, and training in the use of the limbs should be the later management of all operative cases, in order that the patients may derive the full benefit from the operation.

IDIOCY

Generally speaking, there are two varieties of idiocy—the *pre-natal* and the *acquired*. There is a very close association between idiocy and cerebral palsy. Not all idiots suffer from paralysis, neither are all cases of cerebral palsy idiots; in the majority of the cases, however, when either is present, the other will be found

associated in a greater or less degree—sometimes the mental, sometimes the physical, infirmity predominating.

The degree of mental impairment varies considerably, being dependent upon the location and severity of the brain lesion, and whether it is a sclerosis, porencephalus, atrophy, or is due to a lack of development. There are cases in which there is scarcely sufficient cerebration for the patient to recognize his parents, and others in whom it is difficult to determine whether they are within or without the border-land which we have come to regard as normal. The diagnosis in most cases can be made at a glance. In two of the types, both pre-natal, the Mongolian idiot and the cretin, some confusion may exist in differentiation. The latter will be discussed separately in another section.

Treatment.—The management of idiocy is to be considered from two standpoints: First, as to the physical condition. Under this heading is included the correction of deformities and the management as to hygiene and nutrition. The latter, of course, should be the best obtainable in any given case. The other consideration rests entirely upon the mental aspect of the case and concerns not only the patient but the family and their immediate interests. It may be said that, without exception, the place for a mentally defective child is in an institution which is devoted to the care and teaching of such children. He should be placed where much will not be expected, where he will be associated with others of his kind, where his work and his play are adjusted and presided over by educated men and women who have made such conditions the study of their lives. The idiot has rights. He has a right to live out his unfortunate life in as pleasant a manner as possible, and this is better accomplished in an institution than in any individual home. Here, among other things, he is taught, according to his capacity to learn, useful occupations, and not a few thus taught become self-supporting. At rare intervals one is found who possesses remarkable mental traits along certain lines, traits which the average normal individual is incapable of understanding. I have one such case under my care. Cases showing a moderate degree of infirmity often become skilled in handicraft. They execute mechanically with surprising accuracy. There have been great geniuses of the past who in some respects were not considered mentally normal by their contemporaries.

It is impossible to form even a fair estimate as to how the mentally defective child will develop, with age and suitable instruction from those who are best able to discover his possibilities. The placing of these children in public institutions is often strenuously objected to on sentimental grounds by the poorer elements of society because of their fears and prejudices against such institutions, and in consequence the child is kept at home, greatly to his detriment

and to the decided injury of other children in the family. Time and again I have pleaded with the mothers and fathers of such children without avail. Few villages throughout the country do not have an idiot or an idiotic epileptic for school-boys to taunt and for school-girls to fear. Most pitiable objects are these human derelicts, with whom the State does not interfere because they are "harmless." The prejudices of parents are largely due to the spasmodic attacks of virtue of the so-called "yellow" press, which periodically writes up, often with illustrations, under glaring headlines, the abuses in this or that public institution, all of which is solely in the interest of their circulation. Sooner or later, if he lives, the idiot of poor parentage will become a public charge, and the better his condition at the time, the happier he will be.

Parents of means and intelligence will usually place such a child in one of the many private institutions that are conducted for the care of defectives; but the objection will often be raised, even by these people, that in such children there is so little mentality that teaching is useless. This may be true, but if for no other reason, the child should be removed from the home because of his invariably pernicious influence on other members of the family. The vicious, the unclean, and those showing marked moral degeneracy should be placed in institutions as soon after the fourth year as possible. If they are to be a public charge, they should be removed from the home as soon as they arrive at the age limit which the rules of the institution require for admission. If the patient is tractable, he may remain at home until the sixth or seventh year, particularly if there are no other children in the family. In the event of younger children whose natural tendencies and powers of imitation are always strong, the defective child should be removed as early as possible.

ERB'S PALSY—OBSTETRIC PARALYSIS

This paralysis is due to an injury of the brachial plexus during labor. There is little or no power in the muscles supplied by that portion of the plexus which is the seat of the injury. The arm hangs limp by the side. The tendency of these cases, whether involving the upper or the lower arm, is toward recovery unless the nerve lesion is a very grave one.

Treatment.—The atrophy and contractions which develop are determined largely by the extent of the injury and to a lesser degree by the treatment. During the first three weeks in lifting and handling the infant the arm should be protected from other injuries such as may take place in bathing and the other manipulations necessary in the care of a baby. After this time, massage of the entire arm and shoulder with lanolin should be practised at least twice a day, from ten to fifteen minutes at a time. After two weeks, electricity

may be used for a few minutes each day. If the child can bear it, the faradic current answers best. But in case there is no response to faradism, the galvanic current should be used. Under massage and electricity, the improvement in the arm is often most satisfactory. It is not well, however, to promise the parents that a normal arm will be the outcome. I have seen cases in which there was almost complete restoration of power after it had been entirely lost, while in others the arm was permanently disabled. The degree of improvement is dependent upon several factors, the chief one of which—the extent of the nerve injury—is in every case uncertain. Operative measures consisting of grafting and transplanting of the nerve have been advocated recently by many surgeons. I have had no experience along this line. It would seem to be worthy of trial when it is demonstrated that the case has made all the improvement that it would be likely to make with other treatment.

HICCOUGH

Hiccough is a spasm of the diaphragm, usually due to gastric irritation from the distention of the stomach or intestine with gas or overloading of the stomach with food. Under such conditions it is usually of little consequence, and may readily be relieved, if the attack is prolonged, by an enema of soap-water and a laxative dose of rhubarb and soda. When it occurs with any grave illness, it is a symptom of serious import. Hysterical girls will often have hiccough to quite an alarming degree. The attack usually follows a period of unusual excitement. In these patients, from twenty to thirty grains of bromid of soda repeated in from twenty to thirty minutes will usually control the spasm.

ANGIONEUROTIC EDEMA

Angioneurotic edema is sometimes referred to as "giant hives." When it occurs in young children, it is most apt to involve the tongue and lips. When involving the soft parts, the urticarial lesions often produce an immense amount of swelling. This is particularly apt to be the case when the tongue and lips are affected. I have seen the lips swollen to several times their normal thickness. In the case of a boy four years of age, the tongue and lower lip were tremendously swollen. Speaking was impossible and swallowing difficult. It was supposed that he had been given carbolic acid or some corrosive poison. These cases usually develop suddenly and are apt to occasion great alarm. In the case referred to, I was called thirty miles into the country to see the child in consultation. Cases have been reported in which the swelling of the tongue was sufficient to produce suffocation, necessitating incision into the tongue to reduce the swelling. The cases I have seen have always been associated with gastro-enteric disturbances. The swelling

usually disappears very rapidly, although not quite as rapidly as it develops. At the end of twenty-four hours but a slight enlargement ordinarily remains.

The treatment of this form of urticaria is the same as that of urticaria in general. The intestinal canal should be kept purged with saline laxatives and the patient put on a barley and broth diet for two or three days to relieve the intestinal tract.

For local purposes, where the mucous membrane alone is involved, a two percent solution of sodium biborate in water, applied on pieces of old linen, has given the best results. This may be continued until the swelling becomes greatly reduced or entirely disappears.

SYPHILIS

PRIMARY CONGENITAL SYPHILIS

Treatment.—The only means of treating congenital syphilis in infants is by the use of mercury, either locally, as by inunctions, by internal administration, or hypodermatically. The hypodermic use of the mercurial preparations, such as the albuminate or the salicylate, are, for obvious reasons, not to be advised in young children. The use of the needle would have the effect of sending the patient to others for treatment, particularly if the case were seen in out-patient practice. The use of the mercurial ointment by inunction is a satisfactory method in hospitals and in children's institutions, where a nurse can make the necessary applications; in private, however, it is objectionable because of the inunction itself, which may cause comment, and because of the staining of the skin. In fact, this treatment cannot well be carried on without other members of the family becoming acquainted with the nature of the illness. Definite rules for the management, as regards kissing and the care of feeding utensils, should be given, so that the other members of the family may be protected and the real condition remain unknown. Among the poorer class and in out-patient work I have found the inunction method unsatisfactory, for the additional reason that its use is not continued sufficiently, and it is very apt to be indifferently done. It is often postponed and forgotten, and as the disease permits of no temporizing, it is for the interest of the patient that the most effective means possible for its control be brought into use at the earliest possible moment, and that is by internal administration.

If the inunction is employed, the mercurial ointment, U. S. P., should be used, ten grains being rubbed into the skin daily. The rubbing should be continued about ten minutes, as this time will be required for the ointment to be thoroughly rubbed in. The use of mercury internally gives the best results among all classes. It is my observation, after the treatment of several hundred of these cases, that the bichlorid of mercury in small, frequently repeated doses is the best medication. It is given in tablet form. Its use will have to be continued for a long time, and, as people are fond of giving drugs, we cater to the weak side of human nature, and thus do the greatest good to our patient.

Mercury—The Dosage and Method of Administration.—For all infants under one year of age the scheme of medication is the same,

and this one covers the great majority of our cases. Usually they are seen before the third month. I order the tablet triturate of bichlorid of mercury, $\frac{1}{200}$ grain. The mother is instructed to give two tablets daily, morning and night, after feeding. She is told to give on alternate days an additional tablet, after feeding, until five are given daily or until the mercury produces loose green stools. It is comparatively rare that an infant of the tenderest age cannot take $\frac{1}{40}$ grain daily without inconvenience. If green stools with a watery tendency result, the increase is temporarily withheld. It is very rare that the above amount will not ultimately be taken without inconvenience. Further, the dosage of from $\frac{1}{40}$ to $\frac{1}{30}$ grain in twenty-four hours, in the great majority of the cases, is all that is necessary to control the disease. If an improvement does not take place after a week's administration, in the absence of intestinal symptoms, the amount may be increased to $\frac{1}{20}$ grain in twenty-four hours.

If, after the administration four or five times daily of the bichlorid in the small doses of $\frac{1}{200}$ grain has been continued for several days, improvement does not take place because of failure on the part of the child to absorb the drug, inunctions may be used in addition to the internal treatment. They have been needed, however, in but few of my cases.

Convalescence.—In a typical case the first sign that the child is improving will be the fading of the rash. It disappears gradually, leaving the characteristic staining of the skin, which also clears up in a few weeks. Coincident with the fading of the rash, the coryza becomes less pronounced and the hoarse voice becomes clearer. If there has been an enlargement of the liver and spleen, after a few weeks of treatment, they will be noticed to have diminished in size. The child gains in weight, and if the case progresses satisfactorily, soon looks like a normal baby. This is not always the happy outcome, however. Occasionally we have cases which apply for treatment with the vital powers greatly depressed or with so intense an infection that treatment is of no avail, and they die in a few weeks from marasmus.

The enlargement of the epitrochlear glands is, in my experience, the last sign to disappear, and in many cases these glands, though reduced in size, always remain enlarged without any other persistent evidence of the disease.

Later Treatment.—What should be the further management of such a so-called "cured" case? Are we justified in discharging the patient and allowing him to pass from under our observation? My experience proves the contrary, nor can I state that congenital syphilis is ever cured. I have seen many cases, however, that were apparently cured, and which showed no signs whatsoever of the disease. Against my advice, they have passed from under observa-

tion for two, three, or four years, and then reappeared for treatment because of the presentation of some manifestation of a tertiary lesion—a so-called "tardy hereditary syphilis."

My instructions to the parents or guardians of my syphilitic patients apparently cured, are to bring them to me once in three months for examination. If they remove to such a distance that this is not possible, then I ask them to take the child at the specified time to some other physician and explain to him the nature of the previous illness. For such patients as return, for the first two or three years, I often advise a course of bichlorid for one month out of every three. I do not feel that it is necessary for such a child to show positive specific signs in order to receive this interrupted treatment; if he shows retarded growth or anemia or a history is given of his lack of resistance to disease he should unquestionably have the advantage of the treatment. In such a case I find that the improvement is much more satisfactory when some preparation of mercury is used to supplement whatever restorative treatment may be suggested.

TARDY HEREDITARY SYPHILIS

By tardy hereditary syphilis it is understood that, for some reason, the infection failed to manifest its presence with any appreciable severity until the period of childhood was reached.

In its selection of anatomic sites for its development, and in the nature of the lesion, it closely resembles the tertiary form in the adult. The eyes, the bones, and the nervous system are particularly apt to be involved. The development of the Hutchinson teeth and the involvement of the shafts of the long bones, resulting in a periostitis, are its most frequent manifestations, these together with general malnutrition, are almost always associated with the disease in childhood.

Treatment.—As in the treatment of tertiary syphilis in the adult, so likewise in the treatment of the late hereditary form in children, the iodids play an important part. Much better results, however, are obtained with the so-called "mixed treatment." The iodids alone are not sufficient to give us our best results, and the results with mercury alone are not so prompt and satisfactory as when the two drugs are combined. For an average case of periostitis involving the anterior portion of the tibia in a child four years of age, from $\frac{1}{30}$ to $\frac{1}{20}$ grain of bichlorid of mercury should be given daily, combined with sufficient iodid of potash to produce the characteristic coryza. This may necessitate the giving of from twelve to twenty grains daily, as children vary greatly in their susceptibility to the drug. The mercury and the iodid of potash should not be given in one mixture, as the combination is most disagreeable to the taste. It is far better to give the bichlorid in the form of tablet triturates.

The iodid of potash is best given in a saturated solution, one drop of which represents one grain of the drug. This is best taken when dropped into milk after meals. Beneficial results from the treatment will usually be apparent in a few days. If there is a periostitis, the pain will be the first symptom to disappear.

The administration of the iodid of potash should always be interrupted, chiefly because of its possibilities of deranging the child's digestion. I usually give it for ten days, followed by a rest of five days, when it is again resumed. Proper nutrition in these cases is a most important factor in their management. If the iodid is given to the point of tolerance, its omission for a few days will not be noticed. The mercury is given for weeks continuously in doses of from $\frac{1}{60}$ to $\frac{1}{20}$ grain three times a day, graduated according to the age. Later, when the progress of the case shows that the disease is under control, the two drugs should be given alternately, for ten days each. How long this treatment should be continued must be determined by each individual case. Cases which are apparently cured should be instructed to report to the physician every three months. I frequently advise a course of treatment for three or four weeks, two or three times a year. A sufficient excuse for such action may be the condition of the child, who may show a tendency toward slow growth and improper nutrition. The patient should be kept under observation for years. He should be seen at stated intervals until the adult period is reached, when the nature of the trouble should be explained to him. The disease from which the child is suffering should always be made plain to parents, or at least to one of them, in order that the patient may not be allowed to pass from under medical observation in ignorance of his true condition.

TARDY MALNUTRITION OF SYPHILITIC ORIGIN

The possible manifestations of syphilis in the young, as in the adult, are many. In children, not the least interesting and important are the cases in which late malnutrition is the only evidence of the syphilitic infection. The patients are usually thin, sometimes sallow, sometimes pale, with little or no adipose tissue. They are almost always undersized, as regards height, always underweight, the appetite is poor, and they have but little endurance and correspondingly little resistance. The cases seen by me were between three and ten years of age. When two such children are seen in a family, in which both parents are robust, it is a strong indication that they are suffering from the results of a remote syphilitic infection in one of the parents. The physical examination may prove nothing definitely.

Cases of late malnutrition, non-syphilitic in character, due to poor hygiene and faulty feeding, may present symptoms identical

with the above, so that while the two conditions cannot be differentiated by the clinical signs, there may be sufficient grounds for suspicion to warrant us in questioning the father, when the history of a primary sore with perhaps secondary lesions may be elicited. There may have been prolonged treatment with a subsidence of all the symptoms, and the patient may have been pronounced cured and told that it was safe to marry. Many times have I heard this story when the evidence of transmission was before me in the form of a typical case of congenital syphilis.

Treatment.—Treatment of tardy malnutrition of syphilitic origin by the supportive and restorative methods used in the non-syphilitic malnutrition cases is without avail. (See Tardy Malnutrition, page 164.) These patients require mercury either alone or combined with the iodids. To the usual methods of treatment with iron, cod-liver oil, baths, and massage, there will be but little response, but add bichlorid of mercury or the iodid of potash and the case improves, slowly to be sure, but the improvement is invariable. In the management of such a case the child should be given the advantage of an outdoor life with free ventilation of the sleeping-room at night. The food should be highly nutritious, containing a large amount of proteid. Eggs, meat, milk, and the high-proteid cereals, such as oatmeal, are the most valuable. The dried legumes,—peas, beans, and lentils,—given in the form of purées, are a valuable addition to the diet. Salt baths at bedtime (page 31) during the entire year, followed by oil inunctions during the cooler months, are valuable in restoring the child to a vigorous condition. As these children are almost always anemic, it may be well to combine the bichlorid of mercury with nux vomica and quinin. For a child from five to ten years of age, the following prescription has been used with marked benefit:

℞. Hydrargyri bichloridi.....gr. ss
Tincturæ nucis vomicæ.....gtt. xc
Extracti ferri pomati.....gr. x
Quininæ bisulphatis.....℥j
M. div. et ft. capsulæ No. xxx.
Sig.—One capsule after each meal.

This is given for ten days, when the bichlorid of mercury in tablet form—$\frac{1}{100}$ grain three times daily after meals—is given for ten days. During the ten days when the bichlorid is given alone, maltine and cod-liver oil may be given—one dessertspoonful three times a day after meals. In these cases, iodid of potash is not to be given early in the treatment, for the reason that the appetite is usually poor or indifferent, and the administration of the drug at this time might further decrease the desire for food. The iodid of iron may be used in doses of ten to fifteen drops, three times daily, should the physician desire to change the form in which the iron is administered.

Prolonged treatment will usually be required. These cases should be kept under close observation for at least two years, or until they arrive at adolescence, when they should be made acquainted with the nature of the disease. During the entire growing period the administration of mercury during one month out of every three, or possibly every six, depending upon the child's condition, will insure better growth and a more vigorous development both physically and mentally.

DEFORMITIES

INGUINAL HERNIA

Inguinal hernia is of rare occurrence in girls but comparatively frequent in boys. Predisposing causes, other than the anatomic, are whooping-cough and colic. I have seen several cases due to each of these conditions. In a like manner, constipation or difficult micturition may be a cause.

Reduction.—The reduction of an inguinal hernia in an infant may be difficult because of the distended abdomen and the abdominal pressure exerted by crying. It is best accomplished while the child, with legs and buttocks considerably elevated, is held by an attendant. Gentle manipulation with the thumb, index and second finger, which grasp the lower portion of the tumor, and pressure toward the ring, are usually successful. If reduction is not readily effected, it is better to anesthetize the child, after which it can usually be done with comparative ease.

Treatment.—The treatment of inguinal hernia in infants and young children is by mechanical means or by operation. In infants under one year of age operation is rarely required. The most satisfactory measure in my hands for treating inguinal hernia has been by the use of a hard-rubber, cross-body truss. The pad should be but slightly convex. A hard-rubber truss is readily cleaned, and the cross-body truss keeps its position in young infants better than does any other. If there is a double hernia, the hard-rubber truss or the Hood frame truss, made of hard rubber, may be used. Measurement for the truss is taken around the hips on a plane with the hernia. The child should wear the truss day and night. By placing the truss in hot water for a few seconds or warming it slightly before the fire, it can readily be bent so as to fit the patient comfortably. When the truss is removed for the purpose of cleansing, which should be done twice a day, a helper should be at hand to support the ring so that there shall be no descent of the hernia. One descent may mean that several weeks' care has been brought to naught. It is well to keep the skin under the truss well powdered when first applied, and the child is often made more comfortable by placing absorbent cotton between the skin and the hard rubber.

As the child grows, the truss will have to be changed frequently. Its use should be continued for at least one year after the last descent of the hernia. Operation is required when the hernia becomes strangulated, and it is always to be advised in older children if a

cure is not effected after two years' treatment by truss. Many of my cases have entirely recovered in less than six months. The use of the truss, however, is continued as just mentioned with a view to protecting the parts and preventing a recurrence of the hernia under stress.

UMBILICAL HERNIA

Umbilical hernia may be either congenital or acquired. However, nearly all cases may be said to be congenital, since the hernia is due, either to a failure in the closure of the ventral laminæ, or to a defective development of the parts at the umbilical opening, which give way under pressure, such as straining in whooping-cough or in colic.

The hernia may vary in diameter from one-fourth inch to one inch and may protrude as much as an inch and one-half. Occasionally cases are seen in which there is an associated ventral hernia immediately above the umbilical. Ten percent of dispensary cases under six months of age have umbilical herniæ, and it

FIG. 45.—UMBILICAL HERNIA REDUCED AND ADHESIVE PLASTER APPLIED.

is by no means rare among the better classes. It usually makes its appearance during the early months of life.

Treatment.—The treatment is entirely mechanical and consists in reducing the hernia and applying sufficient pressure to prevent its recurrence. By far the most effective means is bringing together over the umbilicus (Fig. 45) the two lateral folds of the skin, so that they meet in the median line. The two folds of skin thus placed form a splint. Over this is placed a strip of Z. O. adhesive plaster one or two inches wide, the length depending upon the size of the child. Usually a strip from four to six inches long is required. I have found this method much more satisfactory than any other, as it is followed by a more rapid cure.

The objection to the use of the covered button or any other form of pad is that unless it is very large, it is apt to make strong

pressure upon the abdominal opening, and while it reduces the hernia, the pressure exerted upon the abdominal ring prevents its rapid closure. Not only may it thus act mechanically in preventing the closing in of the abdominal wall, but, through interference with the circulation, the nutrition of the muscles is interfered with and the weakness persists. Umbilical trusses and bandages have been used repeatedly and all have been hopeless failures, and for one reason chiefly—the difficulty of keeping them in position. Any intelligent mother or nurse can be taught in a few minutes how to apply the plaster as above suggested. The child may be bathed with the plaster in position. Ordinarily, it is best to apply a fresh piece every fifth day. Irritation of the skin under the plaster sometimes occurs. If there is a tendency to excoriation or redness of the skin, the folds can be made at right angles to those previously made and the plaster again applied at right angles to the folds. By so doing, the excoriated skin remains uncovered. If the hernia is not particularly large and if the case is seen during the first, second, or third month of life, a cure can be expected in from three to six months. The younger the child, the more rapid will be the cure. Repeatedly, when treatment was begun within the first six weeks, I have seen a large hernia completely cured in a few months. In not one of my cases has operation been necessary.

VENTRAL HERNIA

This form of hernia is of congenital origin and is only occasionally seen in infants. It may be associated with umbilical hernia or it may occur independently. It may be due to a failure of the recti to unite in the median line or it may be due to a weakness or an imperfect development of the fibers of either muscle.

There is rarely any great protrusion of the abdominal contents, as in the other forms of hernia. Usually a ventral hernia manifests itself in a fullness or a distinctly localized elevation of the skin over the site of the absent or weakened muscle tissue in the abdominal walls.

The application of a four-inch strip of Z. O. adhesive plaster one and one-half to two inches wide, placed flat on the skin over the hernia, is all that will be required. The support thus furnished will have to be continued for several months. Operation may sometimes be necessary, but it has not been required in my cases.

SPINA BIFIDA

The results of treatment of spina bifida, regardless of its type or the method employed, will scarcely warrant us in promising parents much in the way of improvement. In my hands the injection of iodin has not been of any value. The pressure treatment is unsatisfactory. Surgery promises better results than does any

other treatment. Operative measures are fully described in works of surgery and the results are sometimes brilliant. Operations, however, are not without immediate danger, for in a great majority of the cases portions of the cord are within the sac, the excision of which may result in permanent paralysis and deformity. It is the duty of the family physician to see that the tumor is carefully protected and kept clean and the child properly nourished until such time as operation by excision or otherwise is thought advisable, which ordinarily is not until the child is one year of age.

HARELIP

The time for the operation for harelip depends, within certain limits, upon the condition of the child. Some surgeons prefer to operate very early and others when the child is several months old. Ordinarily the operation should not be performed before the patient is one month old or delayed after the fourth month, if the child's condition and the season of the year permit. Operations on young children should not take place during the hot months because of the lack of resistance on the part of a young infant to the shock of an operation, and because of the dangers of gastro-enteric complications, the latter being considerable. The matter of feeding need not hasten the operation if other factors in the case are unfavorable for it. The child with harelip may be successfully fed by gavage (page 140) for an indefinite period.

HEMATOMA OF THE STERNOCLEIDOMASTOID

The tumor which is formed in a portion of this muscle is caused by an injury during birth, and consists of a rupture of the muscle-fibers and of the blood-vessels. The tumor may be small, not larger than a filbert, or it may involve a considerable part of the muscle structure. When much of the muscle is included in the tumor, the head of the patient is held in a constrained position with the face directed toward the affected side. The tendency of these cases is to recover without treatment, but it has seemed to me, from an observation of several cases where it was employed, that the absorption of the tumor was hastened by massage, which should be practised for fifteen minutes three times a day. A moderate stretching of the muscle by forcible rotation of the head toward the unaffected side and upward appeared to be of benefit in a few cases, the movements being practised at the same time as the massage.

CLEFT PALATE

Cleft palate may involve either the hard or soft palate, or both. The time for operation, and the nutrition until such time arrives, are all that concern us. Operation should not take place during the first year, and is better performed between the first and the second

years, but not later than the second, as the result is much more satisfactory than if left to a later age. The feeding of the patient is usually considerably interfered with. The child is rarely able to take the bottle, and the various devices for the formation of an artificial hard palate are usually failures. Sucking on the bottle or nipple is, of course, out of the question. A spoon or a large medicine-dropper may be employed in feeding, but their use is tiresome both for the attendant and the child. By far the best method of feeding in these cases is by gavage (page 140). The nutrition of the child may thus be maintained for months, and with results quite as good as by natural methods. I have a child ten months of age under my care at the present time who has always been fed by gavage at intervals suitable for his age, and his development has been perfect.

DISEASES OF THE SKIN

ECZEMA

When one considers the sensitive nature of the skin and its constant exposure to all sorts of irritating influences it cannot be surprising that skin affections are more frequently seen in infants than are any other ailments; and when one recognizes in the skin an organ of absorption, secretion, and excretion, the importance of a careful study of its lesions will be self-evident. Inasmuch, therefore, as what is known as eczema is characterized both by acute and chronic inflammations of the skin, the fact that in its different forms it comprises a large percentage of the skin diseases of young children is readily understood. From an etiologic standpoint, eczema in children may be divided primarily into two classes: those forms due to causes operating from within—systemic conditions; and those due to causes operating from without—local irritations of whatever nature.

Manifestations.—The manifestations of eczema are subject to most sudden changes, an apparently normal skin today developing a weeping eczema tomorrow, while a few days later the skin may again be clear. It is difficult and unnecessary in children to attempt any such differentiation of the various types of eczema as is laid down in works on dermatology; and indeed such a differentiation is difficult, for the reason that in children eczema is not confined to the special adult types, but rather to various combinations of lesions,—every variety of papule, vesicle, pustule, and fissure being often seen in one patient on a surface area of only a few square inches. Infections of the involved areas resulting in pustules and furuncles are more common in children than in adults, because of the ready inoculation and transmission of bacteria through manipulation and scratching, and because of the diminished resistance offered by the child to pyogenic organisms.

Cases Originating from Within.—Such cases are by far the more frequent and the more troublesome. The most susceptible age is from one to twelve months. While cases which have developed during the earlier months may be carried over into the second or into the third year, it is comparatively rare for this to happen, as it is also rare for cases to develop after the nursing age. At this early period the inflammatory process may be limited to a round weeping spot on each cheek, or it may involve all the flexor surfaces, or it may cover larger portions of the skin surface and show all the clinical phases of the disease. The physical condition

of the child exerts no influence upon the development or persistence of the eczema.

Some of my healthiest nursing babies—those who made most satisfactory progress and were well in every other respect—were sufferers from eczema until the nursing period was over or until nursing was discontinued and other food given. In fact, the majority of my cases, both breast-fed and bottle-fed, have been in children whose condition was otherwise satisfactory. There were others, to be sure, who suffered from malnutrition or who were difficult feeding cases. In some of these the eczema was, doubtless, a factor in causing the malnutrition; for on account of the excessive itching, restlessness, and sleeplessness, the child's strength had become so markedly reduced that malnutrition was just as liable to be a result as a cause of the eczema. Athreptic and malnutrition children are very apt to be free from eczema of an acute inflammatory type; the cases we are considering, however, are due to intestinal indigestion and faulty metabolism of such a nature as not to interfere with nutrition. We know from clinical experience that no one cause is operative in all cases, and we know also that our management, to be effective, must be directed toward the intestinal tract and the liver.

Several of my patients who have been sufferers from eczema in babyhood have in later life developed some recurrent illness, such as bronchitis, asthma, or recurrent vomiting. Not a few of these persistent eczemas in infants are associated with gout and rheumatism. In out-patient work a great many cases of acute eczema are seen, and they are not infrequent in office pediatric work. Not all cases are relieved by treatment, but usually some way may be found to relieve most of them. In a few, regardless of treatment, the eczema persists in a less aggravated form, until the child is weaned or until milk-feeding can in a measure be discontinued.

Treatment.—In the breast-fed, a proper regulation of the nursing as regards time and quantity may be sufficient. The relief of the constipation of the mother is all that is required in some eczematous, breast-fed infants. The eczema which is due to high fat or high proteid, or both, in the breast-fed may be relieved by regulating the diet of the mother (page 74) and by insisting upon reasonable exercise. If the child is thriving, making a satisfactory gain in weight, the nursing should never be discontinued because of the eczema. If the mother or wet-nurse has been indulging in too rich food, drinking beer, tea, or coffee in excess, they should be discontinued and a very plain diet substituted. Two grains of bicarbonate of soda given in two drams of water before each nursing is often of service. Of late, in those cases of eczema in which the urine has shown marked acidity I have given with apparent benefit two grains of citrate of potash, three times daily.

In the bottle-fed, the correction of errors in feeding is easier, and, as a whole, such cases are more satisfactory to treat than are the breast-fed cases. The eczema may respond to the treatment of constipation if it exists. It is impossible in a given case to tell whether the feeding as a whole is a cause of the trouble, or some one of the nutritional elements is at fault. My usual way in the bottle-fed is to give a food upon which the child may be expected to thrive. If the eczema is pronounced, the sugar, for a week, is reduced perhaps to 4 percent. When this produces no effect, the 6 or 7 percent of sugar is resumed and the fat or proteid reduced. Working in this way, by a process of exclusion, I have discovered which element in the food was apparently at fault and the eczema has responded to its correction. The food should never be so manipulated that the infant will not thrive.

Illustrative Cases.—One of my patients, a baby otherwise normal, had the most pronounced general eczema that I have ever seen, the entire skin surface being involved. For seven months—until he was past one year of age—I was unable to give this patient more than 1 percent of fat. An increase to 1.5 percent of fat would be followed in one-half hour by an inflammation and redness of the skin. In another case almost as severe—one which I saw at the ninth month—I was unable to give cow's milk in any form. The condition was so aggravated that I discontinued entirely the fresh cow's milk and put the child on condensed milk, when the skin cleared promptly without any other treatment whatever. About six weeks later fresh cow's milk was again tried in small quantities, with a prompt return of the eczema. At different intervals the cow's milk was given for one or two feedings daily, but we were always obliged to discontinue it because of the signs of the old trouble which immediately appeared after two or three cow's-milk feedings had been given. In a girl patient, four years old, one tablespoonful of beef juice or scraped beef will produce an acute eczema of the face and limbs. most intense in character, which requires several days to correct. The child's father has suffered severely with rheumatism for years, and in the mother and her ancestors gout in marked degree has been present for generations. This patient is further interesting, in that she is a cane-sugar susceptible and formerly had attacks of cyclic vomiting every three to four weeks. Cane-sugar is never given even in the smallest quantity. Through the removal of red meat and cane-sugar the cyclic vomiting and the eczema have ceased.

In these obstinate cases, as the urine is usually very acid and a deposit of urates will be found on the napkin, I invariably give bicarbonate of soda, one grain to one ounce of food, or two grains of citrate of potash three or four times daily.

Local Treatment.—The local treatment in the cases of internal

origin is very unsatisfactory, and all that can be accomplished is to relieve the itching and make the child more comfortable. It may safely be said that in the treatment of eczema in infants more harm than good usually results from local measures. As a rule, too strong lotions and ointments are used, which, while they may not increase the irritation, produce enough to retard recovery.

When the face is involved, showing a bright red or weeping surface, the application of bassorin paste usually gives relief. The paste dries on the parts and forms a firm protective dressing. The oil of cade—one-half dram to one dram, to one ounce of collodion—may be used. If there is a very acute infection, fifteen minims of the oil of cade to an ounce of either bassorin paste or collodion is the proper proportion. The face should not be washed nor the applications removed. As it peels off, it should be freshly applied. The bassorin paste[1] will not bear the addition of liquids in any considerable amount, but the oxid of zinc may be combined with it, as may also ichthyol and tar in small amounts. Ointments applied to the face, unprotected, are soon rubbed off and soil the clothing. The mask (Fig. 46) is used in out-patient and hospital cases. In private practice it is often objected to, but is absolutely necessary for the relief of not a few patients. When an ointment can be applied under a mask, or when it is to be used on other parts of the body where it may be bound upon the parts, the preparations of tar afford greater relief than any other application. An ointment composed of the unguentum picis, U. S. P., one part, with unguentum aquæ rosæ, from four to six parts—the strength used depending upon the irritability of the skin—may be applied at least morning and evening. It should be thickly spread upon old linen and bound firmly but gently to the parts. If the existing irritation is at all increased by the application, it should be weakened by a reduction in the amount of tar used. In spite of the eczema, these infants must be bathed. The bran or soda bath (page 31) may be used, care being taken to avoid too much friction of the skin. One of the most troublesome features in the treatment of eczema in young children, regardless of the location of the disease, is the certainty of the patient scratching the involved parts, particularly at night. This obviously tends to keep up the trouble indefinitely. The straight-jacket (page 429) will effectually prevent the scratching.

Eczema Due to Irritation from Without.—Eczema due to irritation from without is not unusual with sensitive skins. It may be caused by strong soaps, by vigorous rubbing, by irritating clothing, such as woolens, etc., or it may result from counter-irritation applied because of some respiratory disorder. Obviously, the management of these cases depends upon the removal of the source of irritation. In some of my cases where woolens cannot be worn I advise that

[1] Manufactured by Lehn and Fink, New York.

the linen mesh be substituted; in others that the garment which comes in contact with the skin be lined with thin soft linen.

Eczema Intertrigo.—Eczema intertrigo is a result of maceration of the skin, where two skin surfaces are in constant apposition. It is most frequently seen in the skin-folds of the neck, the groin, under the arms, and on the flexor surfaces at the elbow-joint. At first there is usually a simple erythema, which if neglected develops into a characteristic eczema. The treatment consists in separating the opposed surfaces by pledgets of cotton freely dusted with equal parts of powdered starch and oxid of zinc. The cotton should be removed as soon as it becomes moist and fresh applications made. Linen or gauze may be used in the same way. Usually this treatment promptly relieves the condition.

A similar maceration of the skin may occur when the genitals and the skin over the inner portion of the thighs, the buttocks, and the lower abdomen are allowed to remain wet with decomposing urine. With very few exceptions these cases are due to neglect. Athreptic and malnutrition infants furnish many of the cases. In a few infants well cared for intertrigo may develop. In these it may be explained by a very acid urine, or it may be one of the manifestations of seborrheic eczema (page 426).

The treatment, with the exception of the seborrheic type (page 426), consists in neutralizing the urine by the use of bicarbonate of soda—two grains three times daily—by protecting the skin surfaces, and, by attention to the napkin, preventing irritation from the discharges. Dusting-powders are of very little use here. The method which has been most satisfactory, and which I have followed with success for years even in the most unpromising subjects, is as follows: The mother or nurse is instructed to keep close watch of the napkin and change it as soon as it is soiled and not to reapply it until it has been washed. She is further instructed to prepare pieces of gauze or old linen of such shape and size as to cover the denuded surfaces. On these slips of linen she is directed to spread zinc ointment most plentifully. The dressing is then applied to the parts and is to be changed several times daily. Over this dressing the napkin is placed. The urine, which is chiefly at fault, is prevented by the ointment dressings from coming in contact with the skin, the treatment being solely protective. At the same time a quantity of absorbent cotton is placed next to the genitals so as to absorb the urine as it is passed and thus prevent its general distribution over the parts. If the ointment is simply spread over the skin and the napkin applied, it will soon be absorbed by the napkin and be of no service. When the case is well advanced toward recovery, scrupulous cleanliness and a dusting-powder composed of equal parts of powdered starch and oxid of zinc will usually be all that is required.

Chronic Eczema in Older Children.—A form of chronic eczema of comparatively frequent occurrence in out-patient cases remains to be described. Some writers refer to it as a "neurotic eczema" and others as a "reflex eczema." The predominating lesions are papules. The first local manifestations are papules, and they remain papules unless other changes are produced by scratching. Oftentimes the papule is tipped with a black speck which represents dried blood and dirt—a result of scratching. A large portion of the skin surface may be covered by the eruption or it may be localized on the arms or thighs. Itching is a troublesome feature of these cases; in some it is almost unbearable, and the patient is often presented with the skin torn and bleeding. The disease is without doubt due to some low form of intestinal toxemia. Often the patient suffers from constipation; he may have a large, distended abdomen and not infrequently quite offensive stools.

Treatment.—The treatment consists largely of internal measures. The best initial internal medication for this condition is calomel or rhubarb and soda, not sufficient to produce purging, although at the outset a purge may be of advantage. For a child from four to six years of age, from two to four grains of rhubarb with six grains of bicarbonate of soda should be given twice daily between meals, for two, three, or more weeks; sufficient should be given to produce one or, better, two soft movements daily. The rhubarb and soda may be given in two drams of a solution of equal parts of aromatic syrup of rhubarb and water. Every fourth night at bedtime one-fourth grain of calomel is given. The diet suitable for the child's age (pp. 134–138) may be given. It generally means a radical change in the feeding methods, as the records usually show that these children have been very badly fed. Nothing is to be given between meals. The best local treatment is an ointment of salicylic acid or tar, either separately or combined. If there is an acute dermatitis as a result of scratching, only a weak strength of salicylic acid should be used, or it may be wise to omit it entirely until the dermatitis has subsided, using instead the plain zinc ointment, U. S. P., with the addition of menthol, as follows:

℞. Mentholi.....gr. x
Unguenti zinci oxidi.....℥j

After the acute dermatitis has subsided the following prescription answers well:

℞. Acidi salicylici .....gr. x
Unguenti picis U. S. P.....℥ss
Unguenti aquæ rosæ.....q. s. ad ℥ij

The ointment should be used twice daily, bound to the parts so as completely to cover the surfaces, thereby getting the full

benefit of the treatment and at the same time protecting the skin from further irritation by scratching. The cases are usually obstinate and treatment will have to be continued from three to six weeks. In those children who have been suffering from this form of eczema for a long time and who show extensive lesions, two or three months may be required to complete a cure.

Seborrheic Eczema.—This form of eczema is due to an excessive secretion of the sebaceous glands which is dependent upon a functional derangement, probably inflammatory in character. It is believed by some dermatologists that the disease is dependent upon a specific infection.

Seborrhea Capitis (*Milk Crust*).—The form in which it is most frequently seen in children develops on the head in the form of thick, dirty, yellow crusts, commonly known as "milk crust." In mild cases the crusts may be isolated or there may be one large patch with several surrounding smaller areas. In some cases the exudation is thick and uniform and covers the vertex of the head like a mask. The exudation consists of sebum, dirt, and desquamated epithelium.

Treatment.—The first step in the treatment is to remove the crusts. The hair should be cut very short. If only a few areas are involved, anointing the parts with vaselin several times daily will soften them so that they may be removed. If the crust is thick and extensive it is best to soften it with sterilized olive oil, which is applied on gauze or old linen. The material used, saturated with the oil, is held in place by a cap made of cheese-cloth. If the dressing is applied at bedtime the crusts may often be removed the following morning. In cases in which the exudation has existed for a long time and is very hard, it may require two or three days, with frequent fresh applications of the oil, to soften it sufficiently for removal without injury to the skin. When thoroughly softened it should be washed off with castile soap and warm water. After the crusts are removed, a reddish, slightly inflamed skin will usually be found underneath. To this is applied an ointment of resorcin and vaselin, twenty grains to the ounce. The ointment is spread on linen or lint and applied to the parts, the gauze cap being worn to hold it in position. In many cases this treatment, used only at night, will be sufficient; only the most aggravated cases need wear the cap during the day. A few applications of the ointment to the parts during the day will usually be all that is needed. A few days' treatment will often relieve the worst cases of seborrhea capitis, after the scalp has been freed from crusts. I have yet to see a case which did not respond when this treatment was properly carried out. It is to be remembered, however, that in these cases there is a tendency for the exudation to return. Mothers and nurses are instructed to keep the ointment in the nursery for use upon the first appear-

ance of the exudation. In children, seborrheic eczema, according to my observation, is comparatively unusual in other portions of the body. Associated with the seborrhea of the scalp, the forehead and face may be involved. In these situations also resorcin is useful, but must be used in much weaker strength—from 0.5 to 1 percent.

Seborrhea Intertrigo.—At rare intervals cases of intertrigo are encountered upon which no impression whatever is made by the methods of treatment suggested on page 424. Several years ago Dr. George T. Elliot, of New York, called my attention to the fact that these cases were of seborrheic origin, and that a change from the ordinary treatment to that ordinarily used for seborrheic eczema would prove his contention. In the cases in question, and in those that I have seen since, the point made by him has been confirmed by the treatment. Cases of seborrhea intertrigo are generally associated with seborrhea elsewhere, usually of the head, and show erythema, a tendency to dryness of the skin, and desquamation.

The treatment in this form of intertrigo consists in cleanliness and diet, as mentioned under Intertrigo, page 424. In addition to the usual means, from 0.5 to 1 percent of resorcin should be added to the ungt. zinci oxidi which is used as a dressing. Seborrheic eczema is not as difficult of management as the other forms of eczema in children, but there is a great tendency for it to return, particularly in cases of low vitality.

Fig. 46.—The Herty Mask in Position.

The Mask.—In facial eczema the itching is often most intense. In order to effect a cure, scratching and rubbing the parts on any

object with which the child may come in contact must be prevented. The Herty mask[1] (Fig. 46) answers this purpose admirably. The ointment or lotion is placed on clean linen, which rests on the involved parts. Over this is placed the mask. In Fig. 47 is represented a

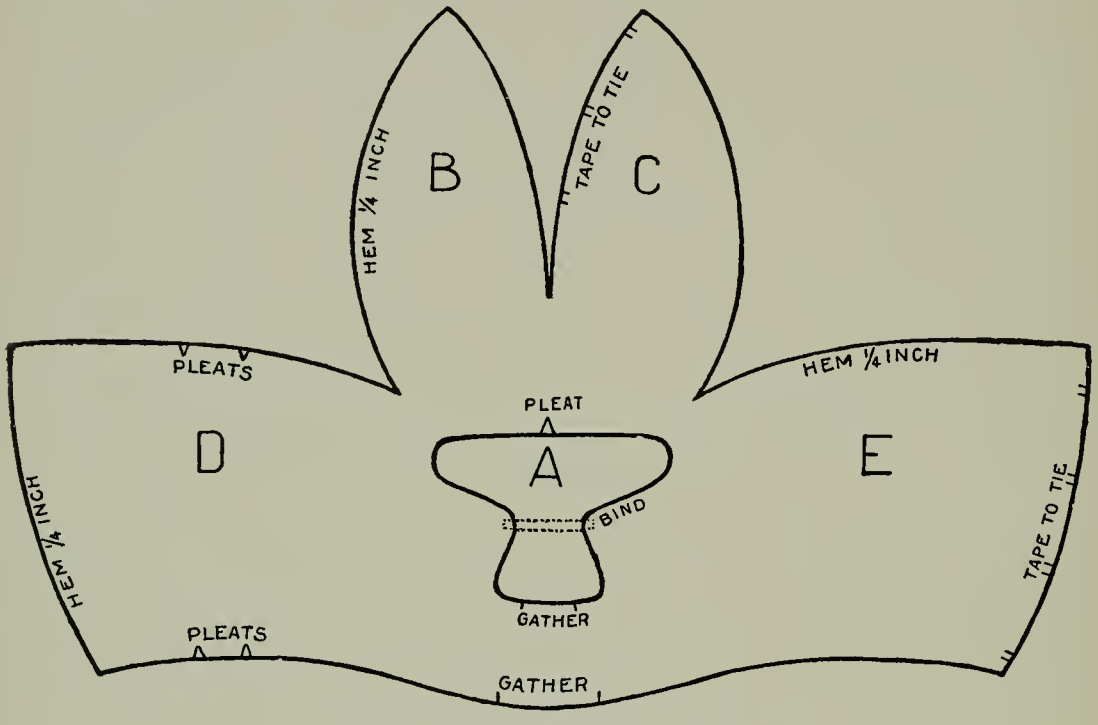


Fig. 47.—Pattern for the Herty Mask.

pattern of the mask. Opening A is sufficiently large to furnish space for the eyes, nose, and mouth. An elastic band, which will be seen to pass over the upper lip, draws the sides of the opening together, insuring protection to the cheeks, usually the parts chiefly

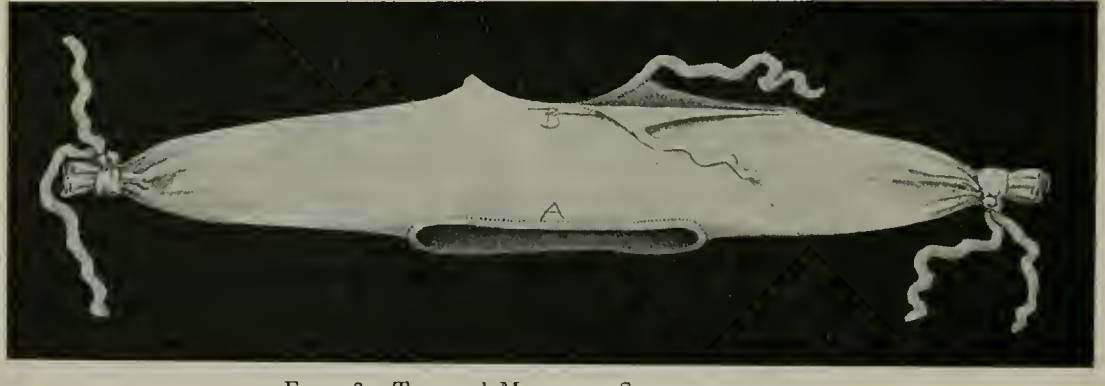


Fig. 48.—Thomas' Modified Straight-jacket.

involved. B and C pass over the top of the head and are sewed to D and E, which pass over the ears to the back of the head, where they are united. The masks are best made of muslin or thin old linen and are to be renewed daily.

[1] Made by Miss Herty, 420 West 116th St., New York City.

The Straight-jacket.—One of the difficult features of treating children with eczema is the tendency for the child to scratch the involved parts. This not only keeps up the trouble indefinitely, but the nails are often the carriers of infection. I have seen not only severe dermatitis, but furunculosis and cellulitis develop in this way. One of the best means of preventing night scratching during the sleeping hours is in the use of the Thomas modified straight-jacket (Figs. 48 and 49). The jacket is made of muslin and must

Fig. 49.—Thomas' Modified Straight-jacket in Position.

be fitted to the patient. The child is slipped into the jacket feet first. The opening A encircles the thorax directly under the arms. The opening B is closed about the neck with the attached tapes. The cord which is used to close the end of the sleeves may be tied to the sides of the crib or pinned to the bedding. Children readily accustom themselves to the position of lying on the back, which its use necessitates. It is no kindness to allow a child to further irritate the already badly involved surfaces.

URTICARIA; HIVES; NETTLE-RASH

Urticaria is characterized by the sudden appearance and disappearance on the skin surface of wheals of vasomotor origin. The wheals, which are associated with intense itching and burning, are of different varieties and subside without desquamation. They vary considerably in size and shape, which fact has given rise to a differentiation into types for purposes of diagnosis. For our

purpose a division has to be made from the etiologic standpoint only.

Urticaria may be due to agencies operating either from without or from within. An agency operating from without may be an irritant of almost any nature—the bites of insects, clothing which may irritate the skin, or clothing which is too tight. Contact with different plants may also produce the wheals. Such causes as these, however, are factors in but comparatively few cases. The management, obviously, is the removal of the source of irritation and the application of a simple ointment, such as one composed of ten grains of menthol to one ounce of cold-cream, or the parts, if not too extensive, may be bathed with a 1 percent carbolic solution.

Irritation arising from internal sources is the cause of the condition in at least 95 percent of the cases. The use of certain drugs may furnish sufficient irritation to cause the outbreak. I have in not a few instances seen hives due to quinin, arsenic, or antipyrin. The administration of diphtheritic antitoxin produces urticaria in from 15 to 20 percent of the cases. Certain articles of food, such as strawberries, tomatoes, oatmeal, and buckwheat, invariably cause urticaria in some children. Digestive disturbances of any nature, whether acute or chronic in character, may cause urticaria. In an attack, therefore, where no external cause can be discovered, and where drug idiosyncrasies can be eliminated, it is fair to assume that the source is the intestinal canal. A safe procedure is to give a full dose of castor oil—two to four teaspoonfuls—or one grain of calomel in divided doses, followed the next morning by the citrate or the milk of magnesia. At the same time, the diet, regardless of the age, should be reduced to broths and gruels, to which toast or dried bread may be added if the patient has been accustomed to it. Milk should not be given during the acute stage. A laxative, a reduced diet, and the application of the menthol ointment already referred to will usually be all that is required. In those that persist in spite of these measures, which include the antitoxin cases, salicylate of soda (wintergreen) will bring them to a termination sooner than any other measure. For a child three years of age two grains of the salicylate of soda may be given every two hours, with four grains of the bicarbonate of soda—five doses being given in twenty-four hours. After this age from three to four grains of the salicylate may be given at a dose—from twelve to twenty-four grains in twenty-four hours. Certain children appear to be predisposed to urticaria and give a history of having had several attacks. Children who suffer from persistent intestinal indigestion are very liable to recurrent attacks, which are sometimes very obstinate in character.

IMPETIGO CONTAGIOSA

This disease is dependent upon a localized skin infection. It is contagious, several children in the same family or school often having the disease at the same time. I have known one school-child to infect an entire class of twenty. Cases of impetigo are seen almost daily in out-patient work. There are no constitutional symptoms, there is rarely any itching, the only evidence of the disease being disfigurement of the skin occasioned by the dry, adherent crusts. The encrusted areas may be isolated or they may coalesce, forming large masses.

Treatment.—The most satisfactory treatment with me has been to soften the crusts with sterilized olive oil applied on gauze, the gauze having first been saturated with the oil. The oil-soaked gauze is then bound to the parts. Usually in twenty-four hours the crusts may readily be removed. Afterward an ointment composed of 10 percent boric acid in ungt. aquæ rosæ, or one composed of 10 percent ichthyol in vaselin, should be applied on sterile gauze and bound to the suppurating surface. The dressing should be changed at least night and morning. Recovery is usually complete in from two to three days. When the crusts are on the lips or other portions of the face where the dressing described cannot readily be applied, they should be kept moist with either the boric acid or ichthyol ointment. Fresh ointment should be applied at least every three hours, both before and after the crusts are removed, if treated without the use of the gauze.

PEMPHIGUS

Pemphigus in the newly born is an infection of the skin manifesting itself in a bullous eruption which may appear on any portion of the skin surface. An epidemic of pemphigus occurred a few years ago in the New York Infant Asylum. The patients were mostly well-nourished infants, and nearly all that were born during a period of four weeks, twenty-six in number, developed the disease. The blebs varied in size from one-eighth to one-half inch in diameter and were filled with light yellow serum. The examination of the serum showed uniformly a pure culture of the staphylococcus albus.

Treatment.—The management consisted in opening the blebs and in the application of various antiseptic solutions and ointments. Not much improvement followed the treatment, nothing worthy of note being discovered until creolin baths were used. This treatment not only relieved those cases which had developed, but the systematic bathing in a 1 percent creolin solution of all the newly born in the institution prevented the spread of the infection.

In two cases seen by me in consultation, pemphigus was associated with a marked syphilitic infection. The patients lived in the country, at a considerable distance from New York City, and facilities for taking the serum for examination were not at hand. In a general way the infants presented the same clinical appearance to the above, with the exception that the syphilitic cases were much more severe. There was fever, with considerable dermatitis. The blebs also were present on the palms of the hands and soles of the feet, which was not the case in the simple staphylococcus cases. Both the syphilitic cases terminated fatally within twenty-four hours after my visit.

ERYTHEMA NODOSUM

Erythema nodosum is characterized by the formation in the skin and subcutaneous connective tissue of multiple brownish nodules of varying size. They are most frequently seen over the anterior surface of the leg, less frequently posteriorly. They are exceedingly painful to the touch. In two of my cases they were associated with peliosis rheumatica, and all were in rheumatic subjects. Pigmentation follows the disappearance of the nodules. There is usually moderate fever and the child complains of general soreness and pain throughout the body, in addition to the pain caused by the nodules.

Treatment.—The patient should be kept in bed until the acute febrile period is passed and the nodules begin to disappear. The treatment is begun with the administration of one or two grains of calomel followed by a saline laxative. As the disease is probably one of the many protean manifestations of rheumatism, it should be treated as to diet and medication according to the suggestions laid down in the section on Rheumatism. The most satisfactory local measure for the relief of pain is the lead and opium solution, U. S. P. Soft old linen or gauze is moistened with the warm solution and applied to the parts, over which oiled silk or rubber tissue is placed to prevent too rapid evaporation and held in position by bandages.

Illustrative Case.—The patient, a delicate young girl, had three crops of nodules, the different crops having appeared at intervals of about three months. The first attack was associated with peliosis and urticaria. The treatment which I had employed successfully previous to this case was that of the salicylate and bicarbonate of soda and antirheumatic diet. This patient, who is markedly rheumatic, had taken large quantities of the salicylate, and its readministration had no effect; but the nodules began to diminish and disappeared completely in all three attacks under the administration of thirty grains daily of iodid of potash.

The duration of my cases has been from ten days to three weeks, with the exception of the one referred to, which persisted for six weeks, or until the iodid was brought into use, when the improvement was prompt.

ERYTHEMA MULTIFORME

As its name indicates, this disease manifests itself in many different forms. There may be reddened papules, macules, and erythematous areas, all of which are most frequently found over the dorsal surfaces. In children there are usually associated disturbing disorders of digestion. Children of rheumatic inheritance are the most frequent sufferers. The condition is often confused with urticaria. As a result of the infiltration into the skin, the lesion of erythema multiforme requires several days for resolution to take place, while the lesions in urticaria are very transient in character, rapidly appearing and disappearing. In erythema there is usually very little itching.

The treatment consists in relieving the constipation, or whatever digestive disorder may exist, and the use of salicylate of soda; for a child five years of age, from eight to twelve grains daily should be given, in divided doses after meals. In case there is itching or irritation of the parts, an ointment composed of menthol, ten grains to one ounce of ungt. aquæ rosæ, will usually furnish relief. The eruption seldom lasts longer than a week. A pigmented area may remain at the site of the lesion.

RHUS POISONING; IVY POISON

Contact with *Rhus toxicodendron* produces in many people a most active dermatitis. There is marked burning with considerable itching of the involved surface. There may be a simple erythema, but usually there are small vesicles and bullæ filled with serum, which, if they become infected, form pustules with the possibility of multiple abscesses. When the face is involved, great disfigurement may result.

I have used various measures from time to time in the treatment of this form of dermatitis. For the acute stage—the period of itching, burning, and edema—there is no better remedy than the fluidextract of *Grindelia robusta*—one to one and one-half drams to the pint of water. In the very acute cases one dram would better be used at first. It is best applied on lint or soft old linen as a wet dressing. The solution should be used cold and renewed every fifteen to thirty minutes. During the stage of resolution a saturated solution of boric acid may be used in the same way, or, what is more convenient, an ointment composed of 5 percent boric acid in ungt. aquæ rosæ. This is applied to the parts on linen, after which resolution usually takes place promptly. When pus-

tules develop they must be opened and the parts treated with a wet dressing of a saturated solution of boric acid.

FURUNCULOSIS; BOILS

Boils are frequently seen in delicate, poorly nourished children, and are usually due to the inoculation of the skin with the staphylococcus. There is no evidence of any abnormal constitutional state other than malnutrition. The boils occasionally develop in well babies. Under proper management there will be a crop or two, but perhaps not over five or six boils in all. In marasmic cases, in hospital work, I have opened over one hundred on one patient in caring for the successive crops as they appeared.

Treatment.—*Local.*—When pus is evident in the boil, a free incision should be made and the pus expressed. The skin about the wound should be washed vigorously with tincture of green soap or ordinary soap and water. Applying a few drops of a solution of bichlorid of mercury is of little or no value. This in itself will not be sufficient to prevent a reinfection; as some pus invariably escapes upon the surrounding healthy skin when many boils are opened. A wet disinfectant dressing or a disinfectant ointment should follow incision and cleansing. Bichlorid dressings are to be used only temporarily in children. The dressing which has appeared best to prevent the spread of the infection is a saturated solution of boric acid, which is used on gauze or lint, when the involved area is not too large. In a marantic child, when a considerable portion of the surface over the trunk or thorax needs to be covered, the repeated renewal of the solution causes a reduction in temperature which is not desirable. In such infants, and in out-patient work where a wet dressing cannot be used, an ointment of 15 percent boric acid in vaselin is thickly spread on lint and applied to the wound and for a considerable distance about it. The dressing should be changed every six hours. Ichthyol is of little service when used in a strength of less than 20 percent. The odor is disagreeable, it stains the skin and the clothing and controls the condition no better than does the boric acid ointment. Another advantage is that the latter is comparatively inexpensive. With fat children, who sometimes develop boils on the abraded surfaces at the folds of the neck or the nates, and in children who perspire freely, I have used a dusting-powder composed as follows:

℞. Pulveris acidi borici ..... ℥j
Pulveris amyli
Pulveris zinci oxidi..... āā ℥iss
M. Sig.—Dusting-powder.

This is applied as soon as the wound is closed, and the parts are kept dry with it. (See Vaccine therapy, page 527.)

Constitutional.—The constitutional treatment is important. If

the child is marasmic or if he has malnutrition, suggestions found under those headings should be brought into use. In the many cases I have treated, internal medication other than that directed toward the improvement of the general constitutional condition has been without value. The sulphid of calcium and other drugs which are supposed to have a direct influence upon the condition have proved of no service. They were not considered valueless because the patient did not recover, for if the patient is not too reduced in vitality he always recovers, regardless of the treatment. Observation on a series of cases of this type for which opportunity was afforded by institution work has shown that those treated with the sulphid of calcium, for example, made no greater progress than did those to whom it was not given. This line of treatment is an example of "heredity in medicine." A remedy has been advocated by some one of consequence in the past. It is then handed down from generation to generation by writers, many of whom, not having had opportunity to place observations of value behind their advocacy of the measure, have simply repeated what has been said by others.

No matter how extensive the process, children with furunculosis may be bathed as in health. The water used for the bath should first be boiled, and in it bicarbonate of soda, one tablespoonful to the gallon, should be used. Of course, there should be little or no friction of the skin.

SCABIES; ITCH

Scabies is a contagious disease of the skin caused by the burrowing of the acarus scabiei. The disease is seen with considerable frequency among out-patient children. The cases differ greatly in severity, but, in all, the treatment is practically the same, varying only as to the necessity of repeating or continuing it. At bedtime a hot bath is ordered, from 105° F. to 110° F. While in the bath the patient is vigorously scrubbed with a towel, using the yellow laundry soap. After the scrubbing he is dried vigorously and sulphur ointment, U. S. P., rubbed as vigorously into the skin. In forty-eight hours the process is repeated and again repeated forty-eight hours later. A repetition at twenty-four-hour intervals is usually too irritating to the skin. The third treatment usually terminates the case. In quite young children, in whom the sulphur ointment may be too irritating, it may be diluted one-fourth or one-half by the addition of vaselin. This may be done with older children also if the first application produces considerable dermatitis. Care must be exercised in destroying, boiling, or disinfecting all clothing previously worn by the patient.

BED-SORES; DECUBITUS

During any illness with greatly disturbed nutrition, as in cerebrospinal meningitis, typhoid fever, empyema, or in any prolonged

illness with emaciation, constant pressure on the prominent bony parts interferes sufficiently with the circulation to cause destruction of the integument. The most frequent sites for decubitus in children are the sacrum, the heels, and the back of the head.

Fig. 50.—Head-rest to Prevent Bed-sores.

The condition is best prevented by cleanliness, both as to the patient and the bed-linen, and by keeping the latter smooth and frequently changing the position of the patient. The parts as they become sensitive and show redness should be bathed several times a day with alcohol. If this does not relieve the condition, the areas should be covered with diachylon plaster so as completely to cover and protect the involved areas. The air-cushion or the water-bed may be necessary in any prolonged illness.

When the back of the head is involved, the scalp should be shaved and the head allowed to lie in a home-made head-rest which is constructed as follows (Fig. 50): A piece of fairly stiff wrapping-paper, four inches wide, is twisted into a rope, of which a circle four to five inches in diameter is made by bringing the ends together. The paper is then wrapped thickly with absorbent cotton, which is in turn wrapped with a two-inch roller bandage.

PEDICULI

Head lice, or pediculi capitis, are very frequently seen in out-patient and hospital work among children in all the larger cities. Occasionally children become infected in school or in public conveyances, and carry the vermin to other members of the family.

The most successful and cleanly treatment consists in cutting the hair short; this done, wash the head with soap and water twice a day, and after drying moisten the scalp thoroughly with the following solution, daily:

℞. Acidi acetici.....ʒij
Ætheris sulphurici.....ʒiij
Tincturæ delphinii
Spiriti vini rectificati.....āā ʒiv

Improvement will follow a few treatments. The pediculi will be killed and the nits may be removed with a fine-tooth comb. If the

patient is a girl, it is not absolutely necessary to sacrifice the hair. It may be parted from various portions of the scalp and the solution applied without previous washing. However, if the hair is not cut, a much longer time will be required to effect a cure.

TINEA TONSURANS; RING-WORM OF THE SCALP

Ring-worm of the scalp due to the action of the trichophyton tonsurans is of frequent occurrence, and on account of its contagious nature is a disease greatly dreaded in institutions for children. An epidemic once started is only with the greatest difficulty eradicated. The appearance of the scalp is characteristic. Beginning with a few small vesicles, the process extends from the periphery outward, showing the scaly desquamating scalp, and the short stubby hairs broken at their points of exit from the scalp. There may be but one area involved or there may be a dozen. I have seen almost complete baldness result from the coalescence of many of these areas.

Treatment.—Cures are difficult and the treatment must be along radical lines. In an epidemic several years ago at the Country Branch of the New York Infant Asylum, abundant opportunity was offered to test various measures of treatment that had been advocated by different observers. Among others were chrysarobin in various combinations, carbolic acid, iodin, bichlorid of mercury, sulphur, and white precipitate. As a result of much experimentation, a useful scheme of management was established, the report of which may be found in "The New York Medical Journal," of October 10, 1891.

The location of the fungus in the hair-follicle makes it very difficult to apply any drug so that it will be effective as a parasiticide. In order to accomplish this, it is absolutely necessary to cut the hair of the entire scalp as short as possible. Upon beginning the treatment the scalp is thoroughly scrubbed with soap and water, using the strongly alkaline yellow laundry soap so as to remove all the dead hair and desquamated epithelium. The parasiticide to be used is then rubbed into the diseased area and for a considerable distance on the surrounding healthy scalp. The parasiticide which answered best with us was composed of bichlorid of mercury two grains in one-half ounce of equal parts of olive oil and kerosene. The bichlorid must be dissolved in a small quantity of alcohol before it is added to the oil mixture. This is rubbed into the diseased area every day until the scalp becomes sore and tender. In order to prevent the spread of the infection to other parts, the solution may be applied every fourth day, without friction, to the entire scalp. It is necessary in order to effect a prompt cure to produce a dermatitis at the site of the lesion. When this occurs the treatment is temporarily discontinued. When the inflammation subsides another is produced in like manner. After three or four weeks of this treatment

it may be discontinued and the parts kept under observation in order to note the results. A daily application of sterile oil aids in bringing the skin to a normal condition.

In one-third of the children in the epidemic referred to, two grains of the bichlorid of mercury were added to one ounce of the tincture of iodin. Twenty-six cases were treated by this method with an average duration of treatment of eight and one-half weeks. Several recovered in four weeks, while in others twelve weeks of treatment were necessary before it could be discontinued. While the treatment is under way the child should wear a cap, day and night. This may be made of any cheap, light-weight material, which after a day or two of use may be burned. Cheese-cloth caps were used in our cases. Rubber gloves were necessary to protect the hands of the nurse who made the applications, especially if there were many heads to be treated.

The epidemic, which included at least one hundred cases, was controlled by the above means and prophylaxis resulted from the use of the kerosene and olive oil without the bichlorid. It was found impossible to maintain a quarantine permanently or effectually even for a short time, particularly during the warmer months, therefore every inmate of the asylum of the "runabout" age who did not have the disease was treated as though he was expected to get it. Every head was "clipped" and the hair kept short. Twice a week they were given a kerosene and olive oil shampoo.

In private work the continued use of kerosene and olive oil is not popular for reasons readily understood. In such cases the hair is clipped as soon as the case is diagnosed and a kerosene shampoo given. The bichlorid of mercury, two grains to one ounce of tincture of iodin, U. S. P., is applied to the parts with sufficient vigor to produce a dermatitis. If the disease shows a tendency to spread on the scalp beyond the original site it is best prevented by the use of the kerosene and olive oil, as above suggested.

TINEA CIRCINATA

Ring-worm is produced by the vegetable parasite, trichophyton. It may develop upon any portion of the skin surface. The treatment is the use of some irritant that will produce a desquamation of the epidermis in the superficial layers of which the parasite is located. The tincture of iodin has proved a satisfactory remedy if the disease is located where its use is possible. Two or three applications of the U. S. P. tincture is all the treatment that is ordinarily required. If the case is at all obstinate, two grains of bichlorid of mercury may be added to the ounce of the tincture of iodin. If the lesion is situated on an exposed surface such as the face, five grains of bichlorid of mercury may be dissolved in equal parts of alcohol and glycerin and applied locally.

MILIARIA; PRICKLY HEAT

In prickly heat there is an acute engorgement of the vessels of the sweat-glands with obstruction of their outlets. Minute papules form which are reddish in color. The mild cases are without inflammation. When inflammation develops, small vesicles also appear, and may cover large areas of the body. Nearly every infant suffers from prickly heat in the summer. It is most frequently seen on the head and neck and over the chest and shoulders. The patients are very uncomfortable and restless. There is evidently a great deal of burning and itching. The condition is caused by heat, due either to too much clothing or to the hot weather of summer; both causes may be operative. I have frequently seen it in winter in overclad children. Most babies are overclad at all seasons of the year. When prickly heat develops, regardless of the season, it is a sure sign that the child has been kept too warm. The duration of the miliaria is dependent upon climatic conditions and also upon the treatment. I have seen cases which existed for months.

Treatment.—Heavy clothing and flannels are to be avoided. In order to lessen the local irritation, the garment worn next to the skin may be lined with silk, linen, or gauze. The further means of management as regards both the relief afforded the patient and the cure of the condition, consists in the frequent application of cool water, in the form either of a tub-bath or sponging. The soda bath, the bran bath, and the starch bath (page 31) are all most useful. For purposes of sponging, a solution of bicarbonate of soda should be used —one tablespoonful to a gallon of water. The relief afforded the patient depends not so much upon what is used in the water as upon the fact that plenty of cool water comes in contact with the itching, burning skin. Ointments and salves are of little service here, as they tend to produce further maceration of the skin. As local applications, powders are preferred to lotions. A powder used with satisfaction in this condition is of the following composition:

℞. Acidi salicylici ..... gr. x
Acidi borici ..... gr. lx
Pulveris amyli
Pulveris zinci oxidi ..... āā ℥j

This is to be dusted freely over the involved surface several times daily, every hour if necessary. In case irritation is produced by the salicylic acid it may be omitted or its strength may be decreased by the addition of powdered starch.

DISEASES OF THE EAR

EARACHE

In every case of earache in an infant or young child the ear-drum should be examined. It may show intense congestion and bulging, requiring immediate incision, or there may be but slight congestion about the periphery of the drum and at the tip of the malleus. When the latter condition exists there are various means of relieving the pain, the most effectual application of drugs being probably instillation into the ear of equal parts of a 4 percent solution of cocain and camphor-water; five drops of the warm solution are dropped into the ear and repeated every half hour if necessary; after which dry heat may be applied by the use of a hot-water bottle or a salt bag. I have frequently relieved severe attacks of earache by means of a hot-water douche—one pint of water at 110° F., using a douche-bag or a fountain syringe. When the pain is not promptly relieved the ear should be carefully watched, particularly if there are recurrent shooting pains, a throbbing sensation, or a feeling of fullness in the ear. In young children a rise in temperature associated with earache is often indicative of an acute infectious process in the middle ear, and, in addition to the treatment suggested, the ear should frequently be examined, in order to be prepared for early incision of the drum membrane should it be required.

ACUTE OTITIS

Acute otitis rarely occurs in infants and children as an independent affection, but is usually a complication of, or a sequela of some infectious disease. Among my own patients a great majority of cases occurred in association with or following an acute inflammatory condition of the upper respiratory tract due to a mixed infection—a condition which occurs in many of the illnesses of infancy and early childhood; thus, it not infrequently follows simple rhinitis, pharyngitis, tonsillitis, grippe, measles, or scarlet fever. The disease is of much more frequent occurrence in children than in adults. The younger the child, the greater the apparent susceptibility. This susceptibility in the young is due chiefly to three causes: the comparatively patent eustachian tube, the tendency to inflammatory conditions of the throat, and the presence of adenoid growths in the pharyngeal vault—features favorable to the development of infection and for its extension to the cavity of the middle ear.

Otitis in young children is probably more frequently overlooked by the practitioner than any other disease of childhood. This is through no fault of his own, unless it be a fault to omit to examine the ear-drums when the patient has fever; it is because of its indefinite manifestations, and the faulty teachings of text-books as to the symptomatology of the disease. In a search of many works on otology, I find that the symptoms as laid down are dependent almost exclusively upon evidences of pain—earache—the pain being complained of by older children or manifested in the very young by vigorous crying, by tossing the head from side to side, by head-rolling, ear-tugging, crying out in sleep, disinclination to rest the head on the affected side, pain upon manipulation of the ear—in short, we have been taught that there is invariably some manifestation of pain referable to the ear or the adjacent structures in all cases of acute otitis in infants and young children.

Illustrative Cases.—What symptom is most frequently associated with otitis in children? In seventy-two private cases one symptom, and only one, was present in all—*fever*. The otitis was apparently primary in three. In these the condition did not follow and was not associated with any previous abnormal state, as far as we were able to judge. One was associated with or followed German measles; two, scarlet fever; seven, measles; and fifty-eight, grippe or catarrhal colds. In the cases in which the otitis followed, but was not immediately associated with any of the preceding diseases, which was the rule in the majority of the cases, there was nothing especially characteristic in the temperature range. In some there were the morning drop and the evening rise; in the others there was no regularity as regards the temperature range. With but few exceptions the otitis developed during convalescence from an acute process elsewhere, the ear involvement being suspected because of a persistent elevation of the temperature for which no other cause could be discovered. The fact that fifty-eight of the cases, or 81.5 percent, occurred with or followed non-specific, inflammatory conditions of the upper respiratory tract, such as tonsillitis, grippe, and catarrhal colds, emphasizes the necessity for frequent aural examinations during or following such disorders, particularly when there is an elevation of the temperature—a temperature which, in the absence of definite clinical signs, we are apt possibly to attribute to chronic grippe, malaria, typhoid fever, or dentition.

The most interesting factor in this series of cases was the absence of pain or localized tenderness on manipulation in fifty of the cases, or 69 percent. Among those included in the pain group, twenty-two in number, there are some which perhaps should not be so included. In these there were no signs of pain, as we generally expect to find it; but in this group are included those who were very restless, who slept poorly, and those who showed evidence of

any great discomfort. Upon discovering the ear disease and noting the relief which followed incision of the drum membrane, it was fair to assume that the source of the previous discomfort was the ear. Had we depended for the usual signs of pain or local tenderness, in fifty of the cases a diagnosis of otitis at the time would have been impossible. Six were seen in consultation, because of the unexplained, continued fever. Nine had been treated by other physicians who had failed to discover the cause of the continued fever. In

FIG. 51.—HARD-RUBBER EAR SYRINGE.

none of these had ear involvement been suspected, because of the absence of pain and localized signs.

Treatment.—*Operative.*—Every practitioner who has children for his patients should be sufficiently familiar with the landmarks of the normal drum membrane at the various ages of early life to differentiate the normal from the abnormal. In the routine examination of the child, the ear should be included in all conditions associated with angina or fever. In quite young babies an otoscopic examination may show a dull whitish-appearing drum membrane which on a superficial examination of the case might be ignored. In all cases, particularly at this age, when the drum landmarks are indistinct, a cotton-pointed probe should be brushed over the surface, thus removing the epithelial scales which may have lodged there, when perhaps a congested, bulging membrane may be revealed. This point was brought out by Dr. J. F. McKernon in January, 1899, in a discussion before the State Medical Society at Albany.

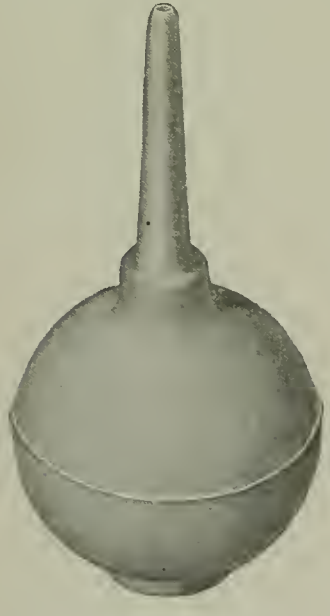


FIG. 52.—SOFT-RUBBER EAR SYRINGE.

Conditions or appearances of the drum membrane which require incision are often difficult of recognition by those not skilled in otoscopy. When the drum is bulging, deeply congested in appearance, with landmarks indistinct, an incision is necessary, and should be made in the posterior portion of the drum, beginning low down and extending upward through Shrapnell's membrane. When also there is congestion of the drum membrane over the tubal entrance, when the congestion extends toward the periphery with indistinct landmarks without bulging, incision is indicated.

Post-operative.—The after-treatment following incision consists in syringing the ear at three-hour intervals with eight ounces of a 1 : 10,000 solution of bichlorid of mercury for three or four days, when the syringing may usually be practised at intervals of from four to five hours until the drum closes. In very young infants if the bichlorid causes a dermatitis at the meatus, it is well to change to a sterile normal salt solution, using the same quantity of fluid. In those cases in which only serum is present at the time of operation, a closure in ten days may be expected; if, however, pus is present, from two to three weeks will be required. A sudden stopping of the discharge usually means that the opening in the drum is closed,

FIG. 53.—SYRINGING THE EAR.

either through plugging of the opening with thick pus or because of the too early healing of the drum: in either event a reëstablishment of the discharge is required by removing the obstruction or by reincision. The chief factors in prolonging the discharge are adenoids and a lowered state of physical resistance. After syringing, the ear should be carefully dried with absorbent cotton. For purposes of syringing, a one-ounce hard-rubber ear syringe with soft-rubber tip (Fig. 51) answers best. If this is not obtainable a douche-bag, at an elevation of not more than three feet above the patient's head, may be used. The douche-bag sometimes answers better for those who are unskilled, or a soft-rubber bulb syringe of a

capacity of one to two ounces may be used (Fig. 52). The small double-current ear-irrigator may be used with advantage in that it largely prevents wetting the patient. With either method, the child rests on his back with his hands pinned to his side by means of a large bath towel, with a pus basin under the ear to catch the flow (Fig. 53). If the nurse can have an assistant, the upright position may be used.

DEAFNESS

Hearing is probably established in the newly born during the first two or three days of life. During the early months of life the hearing is very acute. Acquired deafness is not at all unusual, however, even in comparatively young children. Among its most frequent causes is an extension of an inflammation from the throat to the tubal mucous membrane. In diphtheria, in the exanthemata, in grippe, in tonsillitis, and in many other ailments of early life, there is an associated inflammation of the nasopharyngeal structures. Unless infection of the middle ear occurs, deafness is usually of a very temporary nature. Persistent deafness may be the result of enlarged tonsils, adenoids, or organized changes in the canal or in the middle ear. Among the most frequent causes of persistent deafness in children are adenoids, scarlet fever, and cerebrospinal meningitis. Congenital syphilis is rather an infrequent cause of deafness. Response to treatment in this type is very satisfactory. Deafness at rare intervals follows an attack of mumps and is due to an involvement of the labyrinth, and calls for expert otologic treatment.

Deaf children whose condition is not recognized are often accused of inattention and punished when they are slow in responding when spoken to. They make slow progress in school and are considered stupid. Many such children show defective hearing of a pronounced type, due usually to enlarged tonsils and adenoids.

The management in these cases is to remove the adenoids and tonsils. When relief is not afforded by operation, the child should be taken to an aurist for a careful examination as to the condition of the ears and the hearing capacity.

CHRONIC SUPPURATIVE OTITIS

Not infrequently cases come under our care in which there is a purulent discharge from the ears, oftentimes most offensive, with a history that the discharge followed measles, scarlet fever, or grippe, and that it has continued for weeks or months. Examination may show a perforation of the upper portion of the drum, through which there is a free discharge, but on account of the site of the perforation not sufficient to drain completely the middle-ear cavity; or there may be only a small perforation, too low for effective drainage.

In either case incision should be made and free drainage established. The ear should then be syringed (Fig. 53) at least three times a day with a 1 : 10,000 bichlorid solution. In cases of chronic suppurative otitis it is well to examine for adenoids, as these growths in the nasopharyngeal vault will help to keep up the discharge indefinitely. The presence of dead bone and granulations is also to be considered in the chronic suppurative cases. When the presence of dead bone or granulations is established, it calls for radical operative procedures by a skilled otologist in order to avoid mastoid and intracranial complications.

MASTOIDITIS

It is not necessary to wait for swelling in the post-auricular region, or pain or tenderness over the mastoid in order to make a diagnosis of mastoid disease. The child may object quite as strongly to pressure on the unaffected side or to pressure elsewhere on the skull, which completely negatives what one might hope to elicit by tenderness. Involvement of the mastoid cells may be looked for in any case in which there is pus in the middle ear. A daily elevation of the temperature in purulent otitis with a freely discharging ear is very suggestive of mastoiditis, particularly if there is no other readily assignable cause for the fever. The further signs, continued fever with prolapse of the posterior superior wall of the canal, with the canal rapidly filling with pus after syringing, mean that mastoiditis is almost sure to be present and operation is indicated. With tumefaction and swelling of the soft parts behind the ear—the so-called perimastoiditis—the mastoid cells and antrum will almost invariably be found involved and the radical mastoid operation should be performed.

GLANDULAR DISEASES

ACUTE ADENITIS

The management of acute adenitis in a child depends to a certain extent upon the age of the child and the factors producing the adenitis. One thing is to be remembered, however, in the treatment. It is this: The constant application of an ice-bag will do more toward controlling the adenitis and preventing complications than will any other measure which we possess. Unfortunately, in infants and in a few young children, it is not practicable, being particularly difficult when, as is generally the case, the cervical glands are involved, since it is then almost impossible to keep the ice-bag in place. In older children, after the second year, it should be applied continuously day and night. Where ice cannot be used, the cold compress (page 333) is brought into use, a most valuable procedure. Or I apply cataplasma kaolini as follows: A piece of linen, sufficiently large to cover the swollen area, is thickly covered with the paste and applied to the parts. A fresh application should be made every six hours. The following ointment may be used:

℞. Ichthyoli.....ʒiiss
Unguenti zinci oxidi.....q. s. ad ʒj

The ointment is applied freely on linen, which is covered with oiled silk and held in position by a suitable bandage. Many mothers find it more convenient to use a cap made of cheese-cloth, which covers the dressing and holds it in place. The ichthyol ointment should be freshly applied every six hours. In cases where other measures have been unsatisfactory, I have used successfully Credé's ointment, fifteen grains of which are rubbed into the swollen areas twice daily.

Not only is it necessary to treat adenitis locally, but the source of the infection must be sought for and if possible eradicated. In cervical adenitis the source of the infection is in the mouth, the throat, or on the scalp. Decayed teeth, enlarged tonsils, and adenoids will probably require attention. So also acute tonsillitis and diphtheria, the anginas of grippe and the exanthemata, are conditions any one of which may cause cervical adenitis, which is usually due to a mixed infection. Pediculi capitis is a frequent cause of post-cervical adenitis. The majority of my cases which have gone on to suppuration have been either a pure streptococcus infection or the streptococcus was the most prominent. Such infections may take place with any of the acute infectious diseases, but they are most frequently met with in scarlet fever. In inguinal adenitis, balanitis in boys or vulvovaginitis in girls is usually the source of the infection.

Even when the ice-bag is applied with the first suggestion of swelling and used faithfully, the cases of streptococcus infection sometimes go on to suppuration. Repeatedly I have seen the adenitis, which is often an early complication of diphtheria, disappear quickly after full doses of diphtheria antitoxin. Acute adenitis terminates in one of three ways—resolution, suppuration, or persistent adenitis. When the swelling softens, we know that suppuration has taken place, and our only treatment is to incise freely, allowing the pus to escape, and place in the wound a strip of sterilized gauze to assist in drainage and to prevent too early a closure of the incision. The wound should be dressed once daily. Extirpation of the diseased gland is not to be advised until later, if at all. In fact, a greater part or all of the gland tissue may have undergone suppuration, producing complete destruction.

PERSISTENT ADENITIS

After an acute adenitis, in a small percentage of cases, the gland or glands will remain persistently enlarged, so as to constitute a deformity, or the deformity may be the result of a series of acute attacks, each leaving the gland a little larger than before. Whether these glands are tuberculous from the outset or become so later, it is impossible to state. I know, however, from an observation of several cases, that many of those which do not show the distinctive characteristics of tuberculous adenitis which we have been taught to expect, do show that they are tuberculous upon examination after operation—the glands having been removed because of the unsightly deformity; I have, therefore, come to look upon pronounced persistent adenitis as probably of tuberculous origin, even though but two or three glands appear to be involved. Because these chronically enlarged glands sometimes undergo resolution without suppuration does not prove the absence of tubercle bacilli.

Treatment.—I have treated these cases of persistent adenitis with electricity, massage, drugs, and local applications, but am unable to advise the use of any one of them, nor have the iodids in my hands been of any appreciable value. Constitutional means, of course, should be employed—iron, cod-liver oil, and the hypophosphites being prescribed if the child's condition appears to require them. In many cases, however, such treatment is not called for, as the children are in perfect condition, the process being entirely a local one. I have had no experience with the "*x*-ray" and various "light" methods of treatment which are advocated by some writers. My own observation in the management of these cases has been that when the glands remain for several weeks sufficiently large to produce a deformity, removal by surgical means is the only course to pursue. The operation is a simple one, is quickly performed, and need leave but a very slight scar.

ADENOIDS

By the term "adenoids" is understood a hypertrophy of the mucous glands of the nasopharyngeal vault. They may be associated with an enlargement of the tonsils, or be entirely independent of it.

The growths vary in consistency from friable, sponge-like tissue filled with blood, to those composed largely of firm connective tissue. The age of the child appears to exert but little influence upon the character of the growth. I have removed hard, firmly organized growths from children of eighteen months and two years, and soft, sponge-like masses from children seven or eight years of age. The amount of growth varies also, from a slight fringe of hypertrophied glands situated high up on the posterior pharyngeal wall, to a large mass which completely fills the nasopharyngeal vault.

Adenoids may occur at any age, but are more common in children from two to six years of age. The youngest case I have operated on was six months of age. Cases of congenital adenoids have been reported. Some children have large, roomy, nasopharyngeal vaults; while in others, on account of the high palatal arch and the prominence of the bodies of the cervical vertebræ, the space is very small. In such cases a very small amount of adenoid tissue causes marked obstruction.

The symptoms vary according to the character and the amount of the growth. With a small growth in a roomy vault, there is apt to be a history of a nasal discharge which is usually regarded as a chronic "cold." Many of these cases with a small amount of actively secreting adenoid tissue have most persistent coughs (page 268), which are worse when the child lies down. There may be nothing more than a clearing of the throat; usually, however, the cough is more or less persistent. Now and then it is paroxysmal, and so closely resembles whooping-cough that an error in diagnosis is often made. Such cases oftentimes pass unrecognized. The presence of adenoids is not suspected because breathing is unobstructed, the cough being attributed to the stomach, to dentition, to nervousness, etc. When there is a decided obstruction to breathing, whether due to a large growth or to a small palatal vault, the characteristic signs are sure to be present: The open mouth, the snoring at night, the stupid expression, the disturbed articulation, the persistent nasal discharge, the deafness, the inability to blow the nose, the cough, and the story of chronicity,—all combine to make a picture which can be produced by no other condition. No special class or type of child is affected. We find adenoids not only in the delicate and ailing, but also in the strong and well. Out of hundreds of cases, I have seen very few in which lymphatism could be accused of having any part in the production of the growths.

When to Operate.—The management is operative in every case in which the growth produces symptoms which compromise the health and comfort of the patient. Early infancy is no contraindication to operation, if the conditions are sufficiently urgent. Fortunately, the necessity for a radical operation in the very young, that is, in those under one year of age, is extremely rare. These little patients, however, may have growths sufficient to cause an obstruction, which gives rise to mouth-breathing, to difficulty in nursing, and to a very annoying and persistent nasal discharge.

Operation for Temporary Relief.—In several instances I have relieved these cases temporarily by crushing the growths with the clean index-finger, the top of which is wrapped in a couple of layers of sterile gauze. At this age the adenoid tissue is usually very soft and friable. The finger-nail should be cut very short and the whole hand thoroughly scrubbed and disinfected. The child is wrapped and pinned, usually in a large towel, so that the arms are confined to its sides, and is then placed on its back on the bed or table. A clean towel for wiping away the blood should be placed under the head. The mother and nurse should be advised that a slight bleeding is expected. With the child thus in position, the physician holds the mouth open with a spoon or tongue depressor, and passes the clean index-finger of the right hand backward into the vault and easily breaks up the soft, spongy growth which may be present. The adenoids are by no means removed by this method, but their continuity is destroyed and portions of the growth doubtless slough off, thus affording temporary relief. The child will be able to nurse without inconvenience and the nasal discharge will stop. Operation, however, is thus only deferred until the patient is older. In six months or a year the symptoms will return.

Operation for Permanent Relief.—The only permanent relief lies in a curettage of the vault, and even with a complete removal of the growth by curettage and forceps, there may be a return if the operation is performed on the very young—those under two years of age. When asked by parents if there is danger of a return of the growth, I always reply that a return is possible, and may take place in a small percentage of the cases. The older the child at the time of the operation, the less the liability of a recurrence. The possibility or probability of a return is no argument against the removal of the growths in the very young, for by the time the child is three or four years of age, a great deal of permanent harm may have resulted.

As operation is the only method of treatment, it is one with which the general practitioner should by all means familiarize himself. The operation is not performed by all alike. Some prefer the sitting position without an anesthetic; others employ anesthesia and raise the patient to a sitting position at the time of the opera-

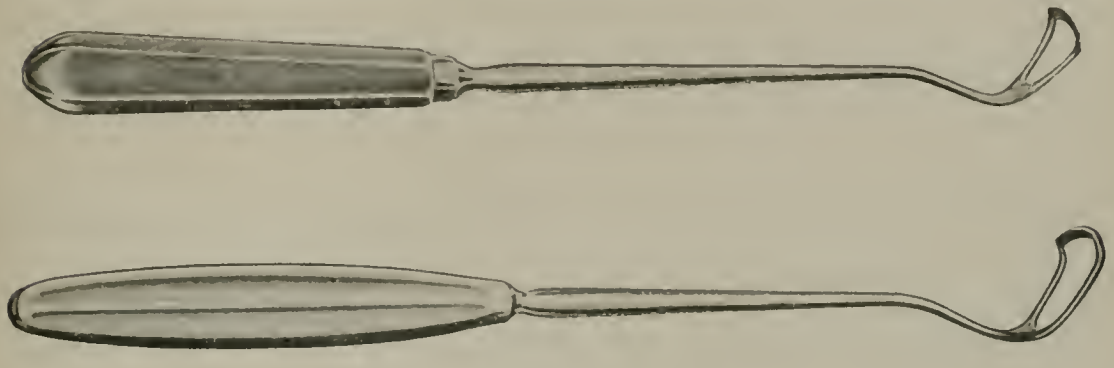
tion. It is my opinion that an anesthetic should be used in every case, unless contraindicated by some such condition as lymphatism or cardiac or kidney disease, which might make the anesthesia dangerous. Regarding the choice of an anesthetic, my preference is to give nitrous oxid gas in children over two years of age to produce unconsciousness, and then substitute ether. This method is far more agreeable to the patient than when ether is used from the beginning. Primary anesthesia is all that is required. In the very young, when gas is not permissible on account of producing cyanosis, ether alone may be used. Chloroform I have learned to regard with much distrust. A boy three years of age upon whom I was to operate for adenoids came near dying under chloroform anesthesia; resuscitation was almost despaired of. With another child I had a similar experience. I have never experienced any unpleasant effects from ether during these operations.

FIG. 54.—POSITION FOR ADENECTOMY AND TONSILLOTOMY.

If the operation is to be performed without an anesthetic the upright position is the best. The child's arms are bound to its sides with a large towel and fastened with safety-pins. He should be held on the lap on the right side of an attendant, who by crossing his legs confines the legs of the patient between his own. The attendant's right arm encircles the child while the left controls the head, which rests against his right shoulder. A basin should be within reach of the attendant, as the bleeding is sudden and profuse.

If an anesthetic is used the child is placed on the table (Fig. 54) with the arms bound to its sides by a large towel or sheet. The Denhardt gag of the O'Dwyer intubation set is used to keep the jaws open. The growth should be located with the finger, and any

adhesions which may be present should be broken up. If the tonsils are to be removed, that should first be done. As soon as the adenoids are removed, the patient is turned on his side so that the blood can drain into a basin which should be in readiness on a chair at the side of the operating table. Before removing the gag the operator should pass his finger into the vault to determine if it is clear; if not, the curet must again be brought into use. The Knight or McAuliffe forceps may be utilized in removing any shreds of tissue which may have been left behind. Two curets are usually necessary, a small and a larger one[1] (Figs. 55 and 56). The operation can be more successfully performed if a curet is used in which the blade stands at an angle, as represented by the drawings. This allows a greater play of the cutting-blade in the vault. A moderate amount of blood is swallowed, which is usually vomited in the course of an hour or so. Parents should be told that this may occur. The child should be kept in bed for the remainder of the day on a reduced



FIGS. 55 AND 56.—ADENOID CURETS.

diet of diluted milk, broths, and gruel. It is my custom to allow, four hours after the operation, three ounces of milk diluted with three ounces of water. A swallow of cold water or pieces of cracked ice can be given at any time. Following the operation I order for the nose an albolene spray, to be used three times daily for three weeks.

Adhesions.—Three months after the operation the mother is asked to return with the child for examination. In several instances I have found that adhesions had formed between the cut surfaces and the soft palate, which had caused a return of some of the original symptoms. These adhesions are readily broken up with the finger, as are also any recurring growths which occasionally may be found.

RETROPHARYNGEAL ADENITIS

Retropharyngeal adenitis, as the name implies, is an inflammation of one or more of the glands which are situated posterior to the

[1] The curets were made for the author by Geo. Ermold Co., 201 East 23d St., New York City.

pharynx between the pharyngeal and prevertebral muscles. Pain and difficulty in swallowing are always present. Other symptoms are fever,—100° to 103° F.,—and loss of appetite. The glands, as a rule, suppurate, forming a retropharyngeal abscess (see page 254). In an acute case an inspection of the throat will usually show a swelling at the right of the median line. If situated low down on the posterior pharyngeal wall, it may escape detection. Upon digital examination, instead of a smooth, flat surface, the finger encounters an elevated, rounded mass, which should not be mistaken for an unduly prominent cervical vertebra.

In retropharyngeal adenitis, while suppuration is the rule, it does not invariably follow. In one case, in a baby six months old, we waited for several days for the suppuration of the gland, which was greatly enlarged. This it failed to do, and the child recovered.

In these cases treatment must be both local and constitutional. Local treatment consists in cleanliness. The mouth should be washed with a saturated solution of boric acid after each feeding. The use of iodids in adenitis in children I have found of questionable service. More is accomplished by a suitable diet and plenty of fresh air.

TUBERCULOUS ADENITIS

The only management of tuberculous adenitis which should be entertained is surgical—the removal of the diseased glands. After the operation the child should, if possible, be given the advantage of an outdoor life in the country, inland. These cases appear to improve most rapidly at an elevation of eight hundred feet or more. The diet should consist of meat, eggs, milk, and of high-proteid cereals, such as oatmeal and the dried legumes, given in the form of purées. It is my custom to order cod-liver oil and malt to be given in doses of from one teaspoonful to one tablespoonful after meals for one week, followed for one week by the syrup of the hypophosphites, when the oil and malt may be resumed for the same time, thus alternating indefinitely with the hypophosphites. If an examination of the blood shows that the patient is anemic, iron may be used in connection with the other remedies. The citrate of iron and the extractum ferri pomatum are well borne by the stomach and have appeared to be of considerable service in some of my cases. For children from five to ten years of age, one grain of the citrate of iron and quinin in sherry wine, or one grain of citrate of iron and ammonia in water, may be given after meals. The dose of extractum ferri pomatum at this age is one-half grain after each meal.

HEREDITY AND ENVIRONMENT

Many of the diseases, crimes, and failures of life are attributed to heredity, as are also vigor of body, attainments, and successes. Heredity and environment are two important determining factors in the life of the child. Both exert their influence over the individual. I had been taught or in some way conceived the idea that the influence of heredity was predominant, but with the closest association with developing children, coming into intimate relations with hundreds of them and watching carefully their physical and mental development, the great influence exerted by environment, which often means only opportunity, has been forced upon me, relegating heredity to the background. That certain diseases, such as syphilis and hemophilia, may be transmitted from parent to child is undisputed; that certain physical states—the so-called constitutional vices—may also be transmitted, is indisputable; but that much of natural physical weakness and hereditary tendencies may be overcome by the beneficial influence of environment is now universally acknowledged. Heredity without favorable environment counts for little. Given an ideal heredity for a child or one of the lower animals, place him under unfavorable conditions of environment and his favorable heritage counts for little. Feeding, care, and general good management shape his physical future much more than does inheritance. In proof of supposed inherited mental traits, the offspring of criminals or drunkards are pointed out as showing how they follow in the footsteps of their fathers and mothers. It must be admitted that here the hereditary influence is bad, but one should remember that their environment has also been very unfavorable.

Mental traits much more than physical are apt to have an influence on the future, and here again brilliant fathers rarely transmit their higher mental powers to their offspring, as is proved again and again in the professional and business world. Many of the ills laid at the door of heredity are due to errors in early management. In the breeding of animals great stress is laid upon pedigree, and credit is given accordingly. It should be remembered, however, that the stock-raiser appreciates the value of the young of his herds, and they invariably get the care that is best calculated to develop the perfect animal, which is exactly what the majority of the children of the human family do not get. A well-bred animal treated as many children from its birth to maturity would cut a sorry figure in the animal world.

HABITS

Children readily acquire habits, good or bad. Under the management of an intelligent attendant, directed by the physician, this natural tendency toward the repetition of an act may be turned to the child's inestimable advantage. There should be established in earliest infancy the habit of taking the nourishment at definite periods, and as the child increases in age, proper habits of sleep and rest must also be acquired. The child, too, should be bathed at a stated time and aired at a stated time each day, and, in general, in order to fulfil the requirements of vigorous animal life, his life should conform to a routine in which there is but little variation. Our sole object being the production of a good adult, only those habits tending toward proper growth and development should be encouraged. The habit of self-entertainment is an important one. An infant who requires to be constantly in arms when awake means a tired attendant, and usually a tired and irritable child.

Bad Habits and Their Correction.—Among the bad habits early acquired and difficult to break, is that of thumb-sucking or finger-sucking and the use of the "pacifier." The penalty paid by these children for such indulgence is thickened, boggy lips due to hypertrophy of the orbicularis oris muscle and adjacent structures. Persistent sucking also produces a forward projection of the upper incisor teeth and an angular deformity of the upper jaw, and to my mind it is one of the very frequent causes of adenoids. At least the angular deformity or high-arched palate results in a marked compromise of the nasopharyngeal space, so that very little adenoid tissue produces marked symptoms of obstruction. The correction of the rubber-nipple and pacifier habit is readily accomplished by the immediate withdrawal of these articles. The child will experience several fretful days and make it unpleasant for those about him. The thumb-sucking habit may be corrected by having the child wear a mitten or glove made of muslin or old linen which is shirred and tied at the wrists. Applying bitter drugs to the fingers or thumb is usually effective in controlling the habit. The tincture of aloes or a solution of the bisulphate of quinin, one dram to two ounces of water, is generally used, the finger being repeatedly moistened with the solution. Mothers will sometimes tell us with considerable amusement that the application of the bitter drug to the finger makes no difference to the child, who appears to like the taste of quinin or aloes. The child, however, soon tires of the bitter taste, and its continued use will always stop the habit. Biting the fingernails may likewise be remedied by the use of these bitter solutions.

The most pernicious habit, masturbation, is referred to on page 455.

It is surprising in how many ways children will develop habits of manipulating different parts of the body. One of my most troublesome cases was in a child one year old who came to me with

an ear stretched to twice its normal size. During the greater part of its waking hours the child grasped and pulled at the top of the left ear.

Another case was in a patient who was brought because of the habit of burrowing the right thumb into the right nostril. The nostril had become stretched to at least three times its normal size, causing a most peculiar deformity.

It is impossible to make other than general suggestions for the correction of bad habits in children. When there is manipulation of the mouth, the sense of taste can usually be made to aid us. In other instances restrictions of a mechanical nature may be necessary. In the ear-pulling case, a tight-fitting muslin cap was worn constantly and the right hand kept pinned to the clothing. Punishment, rewards, and ridicule, all may be effectively used in the treatment of these cases. Regarding bad habits as to hours for feeding and sleeping, as well as the habit of carrying a child in arms—all may be corrected by doing the right thing at the right time and having a sufficient amount of courage to persist in it. It is to be remembered that, regardless of its age, a child is never harmed by rigid discipline properly applied.

MASTURBATION

Before the fifth year a great many more cases of masturbation are seen among girls than among boys. After that age it is more frequent in boys. The most common means of practising masturbation in either sex in infancy is by leg-rubbing. Contact by means of the edge of a chair or the corner of a sofa or any object against which pressure may be exerted is not infrequently the means used in older girls. Manipulation of the parts, while only occasionally seen in girls, is the usual method in boys after the third year. My youngest case was in a female child six months of age who was a "leg-rubber," and who evidently passed through a complete orgasm. In many the habit will be indulged in several times a day.

In boys the primary causes of the practice, other than that of a neurotic habit, are an elongated foreskin, adherent prepuce, and phimosis. The handling of the parts necessary to keep the uncircumcised clean is an exciting factor. In girls, vulvitis and vaginitis, with their resulting irritations, which are not relieved by cleansing and keeping the parts dry, are frequent causes. It is a popular notion that thread-worms may be an exciting factor; but among many cases of masturbation and many cases of thread-worms I have never seen both in the same child.

Prophylaxis.—Masturbation is much easier to prevent than cure. In boys, prevention lies in having a clean, free glans, which in the great majority of male infants can be obtained only after proper surgical procedures. The elongated, thickened, uncut portion of the foreskin usually seen below the glans after a ritual circumcision is

but little better than a free, elongated prepuce. The slitting of the foreskin which is sometimes produced by the so-called dorsal slit gives results very similar in character to a long, redundant foreskin. In girls, prevention in a certain degree rests in keeping the parts clean through washing them once a day with great gentleness, and the free use of non-irritating absorbent powders. A powder composed of equal parts of powdered starch and oxid of zinc gives very satisfactory results.

With the habit of masturbation once established, the first step is to eliminate the cause, if it can be discovered, and put the parts in a normal condition. Circumcision in boys, releasing the adhesions to the clitoris in girls, with cleanliness and as little manipulation as possible, are absolutely essential.

The urine should be examined, and if found highly acid, it should be corrected by diet and by the use of bicarbonate of soda, from six to twelve grains being given daily, according to the age of the patient. If red meat has formed a considerable part of the diet,

FIG. 57.—KNEE-CRUTCH.

the quantity should be reduced and given not oftener than three times a week.

Having removed all possible sources of local irritation, we are in a position to use restrictive measures, as it is through such treatment only that a cure will finally be effected. If the practice is prevented the habit will soon be forgotten. The older the child, the more difficult will be the cure. The restrictive measures employed depend to a considerable extent upon the age, sex, and method of practice. In young children of both sexes who practise leg-rubbing, a large napkin of some coarse material, or a towel, is placed over the napkin usually worn, and applied in the same way, so as to keep the legs widely separated. After the napkin age a large towel may also be used, if necessary, for the same purpose, or the knee-crutch[1] (Fig. 57) may be employed. Some children will indulge only when in a certain chair or in a certain position.

[1] Made for the author by Geo. Ermold Co., 201 East 23d St., New York City.

Illustrative Cases.—A very troublesome case in a girl seventeen months old was treated without success for several weeks, when I discovered that the child practised the act only when in her high chair, as by leaning forward and grasping the projecting arms she managed to bring the necessary pressure to bear upon the genitals. The use of the chair being discontinued, there was no further trouble.

Another child, a girl six years of age, was an inveterate masturbator. She had been treated by several physicians. The act was repeated daily, sometimes two or three times a day, usually by contact, such as by pressure against the corner of a table, sofa, or chair.

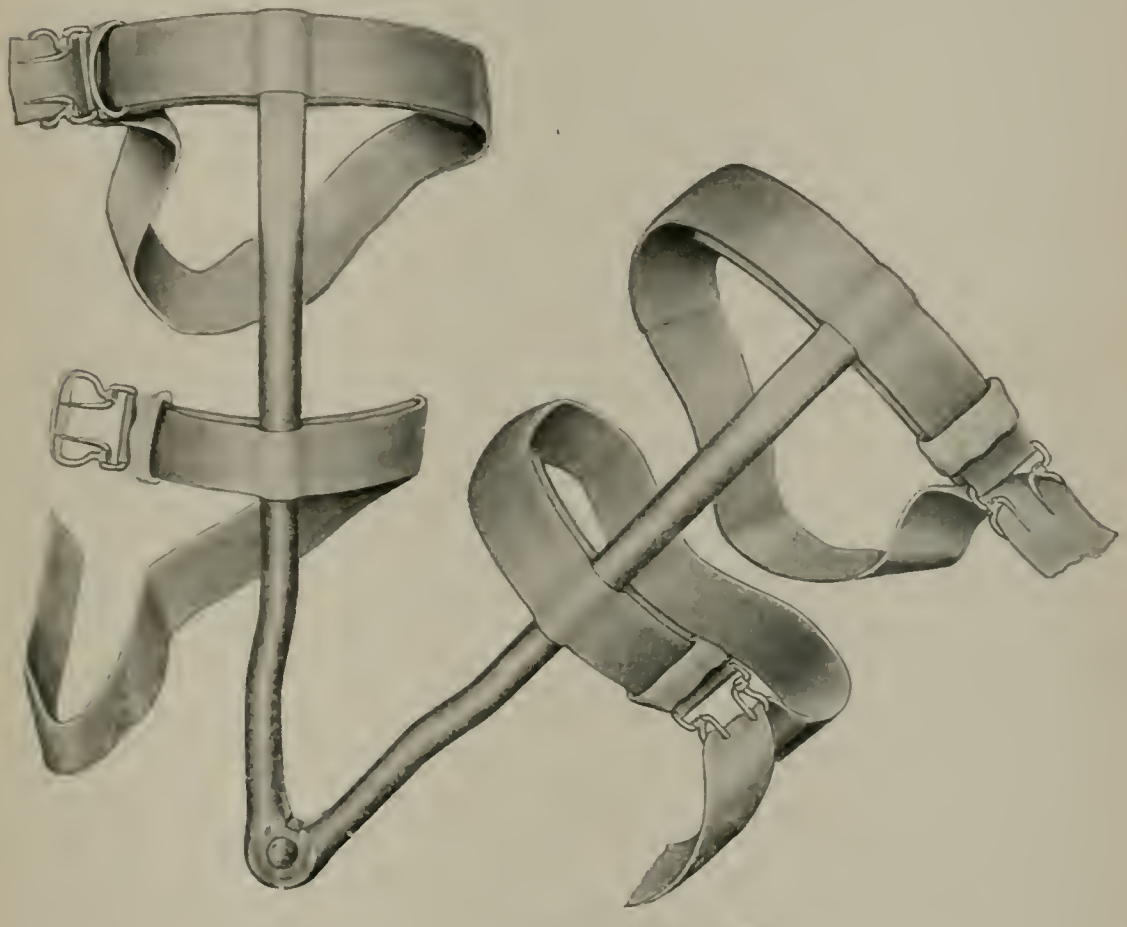


FIG. 58.—BRACE USED TO PREVENT MANUAL MASTURBATION.[1]

When in bed, she indulged in the practice by manipulation. She had become pale, thin, and hysterical, and being a member of a prominent family, great concern was felt for her. It seemed that here was a case where eternal vigilance was the price of safety. The external genitals were congested and swollen as a result of the direct irritation, otherwise they were normal. The gravity of the condition was apparent, and the parents readily agreed to my suggestion that the child should never be left alone. The mother and the nursery maid took turns in being with the child in the daytime. A trusty middle-aged woman was selected for the night

[1] Made for the author by Geo. Ermold Co., 201 East 23d St., New York City.

watch. I directed that no reference be made to the habit, but that the child should be severely punished if the practice was attempted. This, however, was not needed. This child, as is the case with all older children, masturbated in secret, and as she was never left alone the practice was stopped. She was given suitable food, teaching by a visiting governess was begun, and hard play was soon advised, as her physical improvement was rapid. As there was no further tendency to masturbate, the night watch was relieved after six months. The child was kept under the closest observation, however, for a much longer time. Coöperation to such a degree as in this family can, however, rarely be secured.

Older children who practise manipulation of the parts can usually be watched during the daytime, but the habit is apt to be indulged in on going to bed, after the lights are out, and in the early morning, particularly when it is prevented during the day. In such instances, I have been obliged to advise mechanical restraint. An inexpensive and effective means is to use a piece of tape, which is tied in the center around the child's neck in a flat knot, leaving the two ends long enough to be securely tied around the child's wrists, so as to allow a free movement of the hands above the umbilicus. The child can use the handkerchief, and adjust the bed-clothing, but cannot touch the genitals. If the patient is a girl and a masturbator by contact with any object, or a leg-rubber, a large bath-towel, if worn like an infant's napkin, will aid materially in discouraging the practice. A brace (Fig. 58), constructed of steel, with a hinge-joint to allow the arm to be extended to an angle of about 45 degrees, has been used with success in a few cases. This brace is worn only at night.

CONSTITUTIONAL DISORDERS

ICTERUS—OBSTRUCTIVE JAUNDICE

Jaundice of this type in children is usually associated with duodenitis and is caused by a swelling of the lymphoid bodies in the mucous membrane of the common bile-duct at its terminal opening into the intestine, and is due probably to the same form of infection that caused the duodenitis. I have seen but one case in which the jaundice was due to cholelithiasis—that of a girl six years of age. The patient had distinct attacks of biliary colic, with passage of gall-stones, and followed by intense jaundice. She was operated upon later and many stones removed from the gall-bladder.

The onset of my cases has been almost invariably without high temperature, or the evidence of severe gastric disturbance. Usually the first sign that something is wrong with the child is a loss of appetite, a degree or two of temperature, a coated tongue, and listlessness. The yellow discoloration of the conjunctivæ and the skin soon appears, which with the high-colored urine and slightly colored or grayish stools makes the case complete.

Treatment.—*Diet.*—The reason why gastric disorders are considered so prominent a symptom by many writers is possibly because of the gastric disturbance produced by their treatment. We are advised to place the patient on a milk diet and give calomel. I know of no treatment better calculated to produce vomiting and increase both the intestinal infection and the jaundice. The treatment which I have found most satisfactory is the use of very little food for twenty-four hours. Water is given as a drink and chicken or mutton broth well salted may be given with toast later if the child asks for food. He should not be urged to eat. The following day, broths, gruels, and orange-juice, with stewed fruits or lemonade, are given if the child wants them.

Drugs.—The only medication used consists of rhubarb and soda. To a child five years of age I give four grains of pulverized rhubarb and eight grains of bicarbonate of soda from two to three times daily, giving at the same time considerable water. For a day or two sufficient should be given to produce a free laxative effect, but not necessarily to purge the patient. Usually on the third day I begin with tincture of nux vomica and dilute hydrochloric acid—from two to four drops of each, well diluted. With the return of the stools to the normal the usual diet may be resumed, milk not being given for a week afterward. Rhubarb and soda are best given as follows:

℞. Pulveris rhei..... gr. xlviij
Sodii bicarbonatis..... gr. xcvj
Syrupi rhei aromaticæ..... ℥j
Aquæ.....q. s. ad ℥ij
M. Sig.—Shake well. Give one teaspoonful two or three times daily after meals.

OBESITY

Exceedingly fat children will usually be found to be large eaters and of inactive habits. It is rarely a serious condition and ordinarily requires little more than certain restrictions in diet and regularity in exercise. Generally this is not difficult to obtain, as the patient is usually very anxious to reduce the weight because of the attention he attracts and the remarks the condition occasions in public places and among school-fellows.

Treatment.—*Diet.*—In such cases I direct that all fatty foods, including butter and milk, be excluded from the diet. Skimmed milk may be given in moderation—not over one pint daily. It may be used on the cereal, and eight ounces may be given as a drink if the child is fond of it. The use of sugar, including candy and sweets of all kinds, is forbidden. Saccharin dissolved in the milk is used on the cereal and in making stewed fruits and plain puddings palatable.

Exercise.—During the warmer months, golf, swimming, tennis, horseback exercise, and the bicycle are advised, a definite time, in hours, being prescribed each day for some active physical exercise. During the cold months, roller-skating, ice-skating, horseback-riding, out of doors when possible and indoors on inclement days, when the means are at hand, together with long walks, are a part of the daily life. A schedule is prescribed and written out for each day, depending somewhat upon the station in life of the patient, not only as regards food but also as regards outdoor exercise. In this way, by establishing a system of living covering the entire day, there will result, if the family coöperate, a reduction of the obesity with a marked improvement in the patient's general condition.

Drugs.—The use of thyroid extract and other drugs for the reduction of weight in children is not to be advised.

During the treatment the child should be weighed regularly, as too pronounced results are not desired.

THE ANEMIAS OF INFANCY AND CHILDHOOD

A description of the treatment of the various forms of anemia as seen in the young, would be a repetition to a considerable extent of the management of malnutrition. Every child with anemia suffers to a certain degree from malnutrition also. The etiology of practically all the severer blood diseases in children, such as chlorosis, leukemia, the pseudoleukemic anemia of Van Jaksch, and pernicious anemia, is but little understood.

Treatment.—Cases of secondary anemia must be treated along

symptomatic lines. Disordered intestinal digestion with its resulting toxemias and systemic poisoning, which are also little understood, doubtless plays a major rôle in the blood diseases. The management of anemia in the young resolves itself into a correction of existing digestive errors. The bottle-fed baby suffering from a grave form of anemia is given a better chance for recovery if he is placed on the breast. A wet-nurse should always be secured, if possible. When this is not possible the child's food should so be arranged as best to fit his digestive capacity, remembering that as high a proteid as is compatible with digestion should be given. These children also require all the advantages furnished by bathing and fresh air. An indoor airing (page 37) for hours at a time should always be given these children when they cannot be sent out of doors. The sleeping apartment should always communicate with the open air. If the patient is of school-age, the time when we see most of the secondary anemias, he should be allowed to attend only the morning session and be forced to rest for an hour or two after the midday meal. While exercise and play are necessary, they should not be allowed to the point of fatigue. More clothing will be required, both in winter and summer, than is needed for well children of the same age in the same climate. Among my dispensary patients I see a goodly number of these cases. I insist that the child shall occupy the sleeping-room alone and direct that the living-room or "parlor room," as it is sometimes called by these people, be used as the sleeping-room of the patient. If the parents are sufficiently well-to-do to send the child to the country, this is advised.

As with all forms of malnutrition in children, the diet, when there is an associated anemia, is most important. A high-proteid diet should be given; red meat at least once a day, poultry, fish, eggs, milk, and butter; oatmeal, cracked wheat (each cooked three hours), together with the legumes and potatoes, should form the basis of the dietary. Better results, I find, are obtained by selecting foods that are rich in iron than when inorganic iron is given as medicine.

The following table of Bunge may be of assistance in the selection of food for anemic children. It gives the number of milligrams of iron in the dried substances:

Corn	1.0–2.0	Peas	6.2–6.6
Wheat flour	1.6	Black Cherry	7.2
Bovine milk	2.3	White beans	8.3
Human milk	2.3–3.1	Carrots	8.6
Figs	3.7	Strawberries	9.3
Raspberries	3.9	Lentils	9.5
Hazelnuts	4.3	Red Cherries	10.0
Barley	4.5	Apples	13.0
Almond	4.9	Beef	17.0
Rye	4.9	Asparagus	20.0
Wheat	5.5	Yolk of egg	10.0–24.0
Buckwheat	5.7	Spinach	33.0–39.0
Potato	6.4		

It will be seen from the foregoing that the diet of many "run-about" children, viz., milk and the products of wheat flour, such as white bread, crackers, and cake, are substances comparatively poor in iron, and this doubtless helps to explain many of the anemias found at this age among the poorer classes.

Iron.—In a great majority of instances in which iron is given to children it is used indiscriminately, in too large doses, and usually without benefit. It is doubtless prescribed, on general principles, more frequently than any other drug. I am yet to be convinced that it possesses any great value in the blood disorders in children other than chlorosis. Of this I am certain: when it is given without suitable attention to nutrition, digestion, bowel function, and general hygiene, iron is of no benefit, and is more frequently harmful, because it is very apt to increase the defective intestinal elimination, a condition usually present in anemia. The blood of the average child three years of age contains at the most only about six grains of iron. The advantage of prescribing three or four grains daily for a child of this age should hardly be considered. My results in secondary anemia have usually been satisfactory without iron when the prescribed diet and hygienic regulations were carried out. Iron is useful, however, in selected cases of anemia and of considerable service in chlorosis.

In the selection of preparations of iron, those which are least irritating to the stomach, and the least constipating, should be chosen. With this in view, the citrates should be selected if the drug is to be given in liquid form. They are soluble in water and produce less digestive disturbance than do the other forms. The citrate of iron and ammonia and the citrate of iron and quinin, particularly the latter, have been found satisfactory. The dosage for a child two years of age or older is one grain, which is best given in sherry wine after meals. Where a patient can swallow a pill or a capsule, the extractum ferri pomatum in doses of from $\frac{1}{4}$ to $\frac{1}{2}$ grain, three times daily, alone or combined with nux vomica or quinin, will benefit the patient as much as iron is capable of. If the anemia and malnutrition are due to a remote congenital syphilitic infection (page 412), bichlorid of mercury in small doses—$\frac{1}{90}$ to $\frac{1}{60}$ grain, three times daily—is often productive of marvelous results. To my young patients suffering from malnutrition, particularly those in whom I am not certain of the family history, I often give mercury in order to make a diagnosis more certain.

Chlorosis occurs in young girls about the time of puberty or later. It is a disease in which drugs are given with most satisfactory results. Here iron and arsenic do good service, although I have seen cases which showed no improvement under medication make complete recoveries after a change of food and place of residence from the city to the country. Among the various lines of medica-

tion I have found the following combination the most serviceable:

℞. Tincturæ nucis vomicæ ..... gtt. cxx
Extracti cascaræ sagradæ..... gr. x
Extracti ferri pomati..... gr. xv
Liquoris potassii arsenitis..... gtt. cxx
Quininæ bisulphatis..... ℥j
M. div. et ft. capsulæ No. xxx.
Sig.—One after each meal.

This is given for ten days, and repeated after five days' intermission. Interrupted medication is thus continued until recovery follows or until it is demonstrated that other drugs must be used. A patient with chlorosis should have all the advantages of diet and change of scene that the circumstances of the family will permit.

RACHITIS

Rachitis is a disease of nutrition, and is peculiar in that a greater part of the structures which make up the infant organism are involved in the rachitic processes. The bones show the characteristic deformities, the most common of which are the enlarged epiphyses, the square head, the open fontanel, the beaded ribs, and the lateral chest curves. The muscles are undeveloped and flabby, the mucous membranes are prone to catarrhal inflammations, and the nervous system shows a lack of development; rachitic children being particularly susceptible to disorders, such as laryngismus stridulus and infantile convulsions. Rachitic children are invariably anemic. Dentition is delayed, and when the teeth appear they are apt to come in groups of four or more at one time and occasion no little disturbance. Repeatedly it happens that the first teeth are not cut until after the fifteenth month. Rachitic children are late in walking, suffer from constipation, and are usually below the average weight and size; in short, a child with rachitis is unique in the sense that he is constitutionally below the normal in every respect as regards growth, development, and resistance to untoward influences. The rachitic child is an easy mark for any disease which may be prevalent, and while rachitis itself is not a fatal disease, it contributes no small part to infant mortality because of the low vitality which is characteristic of the condition. Bronchopneumonia, pertussis, and the gastro-enteric affections are all very dangerous in rachitic infants. Italians and the colored race are particularly susceptible to the disease. While well-marked rachitis is rare before the sixth month, infants two or three months of age show the beginning characteristic changes in the muscles and bones.

Much has been written regarding the etiology of the disease in its relation to climate and unhygienic surroundings, and while such surroundings may contribute to the result, I have yet to be

convinced that as etiologic factors they are very important. It is true that we usually find rachitic children with unhygienic surroundings, but thousands of others who live under the same conditions do not have rachitis. A child fed on normal breast-milk will endure much that is not hygienic and still not develop rachitis.

In the treatment of several thousand rachitic children, one fact has impressed me most strongly: Given a child suffering from rachitis, we have a child suffering from nutritional errors as a result of improper feeding, or an inability to assimilate a suitable food; and I have yet to see a case which did not improve when suitable nourishment could be given, and assimilated, regardless of the age of the patient. In children under one year of age the feeding of the proprietary foods or condensed milk is the most frequent cause of the disease. The next most frequent cause is the feeding of a too strong cow's-milk mixture, which produces indigestion and faulty assimilation. Breast-fed babies among the Italians and negroes occasionally have rachitis, and an examination of the breast-milk will invariably show a diminution of one or more of the nutritional elements—usually the proteid.

A nursing woman in the New York Infant Asylum had such a free flow of milk that a foster-child was given her to nurse. The children failed to thrive; each made a gain of but two or three ounces weekly; both developed rachitis, one in a marked degree. Repeated examinations of the breast-milk showed it to contain 1.5 percent fat, 4 percent sugar, and 0.5 percent proteid.

After the first year fewer cases develop, but a late rachitis is by no means uncommon. In my own cases the development of the disease at this age and after, as in the very young, has been distinctly traceable to faulty feeding and faulty digestion. Not a few cases between the second and third years were considered due to prolonged nursing. I have known just two mothers who could nurse their children, and substantially nourish them, by the breast later than the twelfth month. Usually when the breast furnishes the only means of nourishment after the first year of life, a beginning rachitis will soon be noticed. The feeding after the first year of an exclusive diet of milk or of indigestible starches is not infrequently a cause of rachitis. Among the poorer classes children during the second and third years are almost always badly fed. The diet usually consists of poor milk and poorly cooked starches. Children thus fed furnish no small part of our rachitic patients.

Treatment.—It will readily be seen from the foregoing that the treatment of rachitis resolves itself into the adjustment of the diet to the needs of the patient. As growth and normal development cannot take place without proteid, and as the history of our cases has shown that this is the element which is most frequently lacking

in the diet of rachitic children, the feeding of the proper amount of proteid should be our first consideration.

The artificial foods and condensed milk are deficient in that in them both the fat and the proteid are low; therefore these foods should be discontinued and a properly adapted cow's milk substituted. This applies to children under one year of age. In a great many cases this is the only treatment required.

Diet.—For those over one year of age, not only should the artificial food be discontinued and cow's milk given, but the cow's milk should be supplemented by a diet rich in nitrogen. I order a diet composed largely of milk, scraped beef, soft-boiled egg, oatmeal, and wheat gruel. After the second year purées of beans and peas are added to the dietary because of the large percentage of proteid which they contain. It is impossible to prescribe a more definite dietary. The physician must remember that a diet as highly nitrogenous as the child can assimilate is to be given. Unfortunately, many rachitic children cannot take cow's milk in quantities sufficient to make it of real nutritive value. This is often the result of an inability to digest the fat, the milk being taken without inconvenience when a large proportion of the fat is removed. Skimmed milk contains at least 3 percent of the chief nutritional element, the proteid, and makes a valuable addition to the diet. If a dilution of the milk is necessary, oatmeal gruel should be used.

Many children who cannot take a full milk diet will take an ounce or two of butter daily without inconvenience. In older children I advise the free use of butter, one or two ounces daily. It is advisable to give rachitic children a moderate amount of fat, as it aids in the production of heat and thus saves the tissues. In children under one year of age cod-liver oil is often a valuable addition to the dietary. In prescribing cod-liver oil I prefer to use the plain oil. In spite of the disgust adults have for cod-liver oil, children usually take it readily. The younger the child, the better the oil will be taken. For delicate children six months of age, from ten to thirty drops may be given three times daily after meals. From the sixth to the eighteenth month, from twenty drops to a dram may be given three times daily after feedings. After the eighteenth month from one to three drams may be given three times daily after meals.

Hygiene.—Brine baths and oil inunctions aid materially in improving the child's condition as a whole, and are of great value. The brine bath (page 31), which is given at bedtime, is followed by an inunction of goose grease, unsalted lard, or cacao-butter. The goose oil or the lard is preferred. At least two teaspoonfuls should be rubbed into the skin. The benefit derived from the inunctions is largely due to the massage. The rubbing should be continued for at least ten minutes; the muscles of the back and legs should

receive special attention. In a few children the animal fats act as irritants to the skin and produce a fine papular eruption.

The rachitic child should have plenty of fresh air, by means either of a fire-place or an open window. On stormy and very cold days he should be given an indoor airing (page 37), being placed in his carriage or cart and wheeled about the room, and, to avoid drafts, the window or windows on only one side of the room should be opened.

Rachitic children are very susceptible to head colds and bronchitis; therefore every means must be employed to prevent exposure. As creeping and playing on the floor are the most frequent ways for a child's taking cold, the exercise pen (page 37) is particularly useful in these cases.

Drugs.—Drugs in my experience are of value only as they increase the appetite and the capacity for properly selected foods. The administration of phosphorus is without avail if the deficient diet is continued. Specific medication without proper food and a fair digestive capacity is valueless. With proper food and a fair digestive capacity, medication is superfluous, and a child rapidly recovers without it.

Phosphorus I have used extensively and have yet to see a single case in which the beneficial action of the drug could be proved. In giving phosphorus, the oleum phosphoratum is the easiest and most convenient method of using it. One drop of the preparation represents $\frac{1}{100}$ grain of phosphorus. For children under one year of age, one drop may be given three times daily. For those between the first and second year, one and one-half to two drops may be given three times daily after meals.

Deformities.—The deformities of the osseous system, particularly of the spine and the long bones, may be prevented—the first, by keeping the child on his back a greater part of the time, and if the deformity is well marked, by teaching him to sleep resting on his stomach. When kyphosis is present the child should be allowed to remain in the upright position but a few moments at a time.

Deformities of the femur, tibia, and fibula occur long before the child attempts to stand, but too early use of the legs, while not necessarily a cause of deformity, may greatly aggravate the existing conditions. For this reason rachitic children should not be encouraged to walk or stand until they have been under treatment for three or four months.

Operative measures for the correction of bow-legs are better postponed until after the third year. If done at an earlier period the deformity is apt to return, and the late deformity may be greater than the original one.

In my experience, the use of braces to correct the deformity of the legs has been of but little assistance, nor has any patient of

mine been benefited particularly when so treated by the orthopedic surgeon. The use of braces and jackets of plaster-of-Paris in kyphosis is usually unnecessary. Rest, massage, and exercises directed to restore power to the weakened muscles have answered well in my cases.

SCORBUTUS—SCURVY

Inasmuch as scurvy is a disease caused by improper feeding, the management is largely dietetic. Sterilized milk and the proprietary meal foods are responsible for a great majority of the cases.

Treatment.—*Dietetic.*—The first step in the treatment is to supply fresh milk for the child, diluted, if necessary, to meet its digestive capacity. I have seen cases in which the diagnosis was made early completely recover under a change from sterilized milk to raw milk, without the aid of any other measure. Inasmuch as the disease is a most painful one, every means possible should be employed toward furnishing early relief. Orange-juice is a specific for the disease. The child takes it greedily. One teaspoonful may be given at two-hour intervals, one ounce being given ordinarily in twenty-four hours. Unless the case is an advanced one, with extensive subperiosteal hemorrhages and separation of the epiphyses, relief will be noticed in twenty-four hours and an entire cessation of symptoms in from five to seven days. I have seen a few cases entirely relieved at the end of seventy-two hours of treatment. These were in infants, in whom the diagnosis was made very early—the only symptom being the evidence of pain during manipulation of the limbs in bathing or while changing the napkin; this is usually the first sign of the trouble.

Illustrative Cases.—A case of long duration under treatment was in a boy eighteen months of age, who had been on almost an exclusive diet of a malted proprietary food from birth. The illness had existed for two months with extensive subperiosteal hemorrhages and required three months of treatment before it could be considered well. In a comparatively recent case in my service at the Babies' Hospital, in which there was separation of the epiphyses of the humerus at the shoulder and of both femurs at the hip, three weeks were required to effect a cure.

The management of more severe cases is the same as of those of milder type. Fresh food with orange-juice or beef-juice must be freely given. The patients should be handled very gently and only when necessary, as the pain on manipulation of the involved parts is most excruciating.

SPORADIC CRETINISM—INFANTILE MYXEDEMA

Sporadic cretinism is due to an absence of, or to a derangement of function of the thyroid gland. In cretinism there is an arrest of mental and physical development, the latter being of a character-

istic type with retarded growth and developmental anomalies not seen in any other condition. Without treatment the cases which live through infancy become dwarfs and idiots.

The Thyroid Treatment.—The specific treatment is the thyroid treatment. The most pronounced beneficial results of this treatment are noticed when it is brought into use early in life. The diagnosis of cretinism is rarely made before the fifth or sixth month, oftentimes much later, for the reason that the case does not happen to come under the observation of those competent to diagnose it.

Illustrative Cases.—In two of my cases the patients were first seen by me, one at the fifth, the other at the seventh month. Other cases have been treated in institution and in private work; the two referred to, however, were seen earlier and almost daily for months, consequently there was an excellent opportunity for observing the effects of the thyroid administration. A fairly complete history of one of the cases is as follows: The desiccated thyroid extract of Parke, Davis & Co. was used. At first it was given in one-half-grain doses twice daily. The beneficial effects were noticed in three days. The first change for the better was observed by the mother, who stated that the child seemed warmer and that less bed-clothing was necessary. The next positive change occurred, according to my records, on the fifth day of treatment. The child's general condition was very much improved. Her extremities were warmer, her color was better, and she commenced to move her arms; but what particularly impressed the mother was that less bed-clothing was needed to keep the child warm. At about the seventh day of treatment the patient cried vigorously when disturbed in changing the napkin, something which she had never done before. She had previously been stupid and apathetic. The next and rapidly following changes for the better, were that the patient noticed and appeared interested in her mother and followed her with her eyes about the room, and while previously she had rarely used her legs or arms except when disturbed, she now began to move them about voluntarily; as the mother expressed it: "The child had acted as though she were under the influence of some powerful depressant drug whose effects were gradually wearing off." When the child was five and one-half months old, after she had been under treatment for sixteen days, receiving one-half grain of thyroid twice daily, she smiled for the first time. She cut the first tooth at the ninth month and walked alone at the fourteenth month. She is now, at two years of age, taking three grains daily, and is apparently normal in every respect.

Dosage.—The increase in the thyroid administration must be determined by the condition of the patient. As long as progress is shown in more active and normal mentality, with an increase in the growth of the long bones and a gradual loss of the typical facial and other

characteristics, it is unwise to increase the dosage of the thyroid. When, however, a period arrives when no progress appears to be made, the daily dosage should gradually be increased by one-half grain. Evidences of overdosage are pallor, prostration, perspiration, and indigestion. When any of the above signs present themselves, it is an indication to discontinue the medication for twenty-four hours and then resume with smaller doses.

When the child in whom treatment was commenced at the seventh month was nine months of age, it was found necessary to give one-half grain three times daily. One month later, one-half grain was given four times daily. At this time the child could sit up and hold the head erect. The increase in the thyroid extract produced vomiting, and the dosage of one-half grain three times daily was resumed. One year after the commencement of the treatment, when the patient was nineteen months old, two grains daily were required.

FIG. 59.—CRETIN, BEFORE TREATMENT.

In both of these infants the protrusion of the tongue was one of the latest symptoms to disappear.

My cases have varied considerably as to the amount of thyroid required. The dosage used was that taken by those in whom the disease was discovered very early in life. The older the patient when the thyroid is begun, the less marked the beneficial results.

I have a little girl five years of age under treatment at the present time who came under my care two years ago, weighing fifteen pounds and three ounces. She made a marvelous improvement under one-half grain twice a day, which in two weeks was increased to one-half grain three times a day. This we were obliged to decrease because of the prostration and perspiration which it appeared to occasion. The dosage of one-half grain three times daily could not be used until she was four years of age. She is now five years old and requires one grain three times a day. In this child the most remarkable improvement was noted. (See Figs. 59 and 60.)

The interval of time between the photographs was thirty-four days. Six teeth were cut in three weeks after beginning the treatment and sixteen more were cut during the next six months. The child made corresponding improvement in every other respect.

For another case, a nine-year-old girl, who is now normal in every respect except that her hair is rather coarse with a tendency to dryness of the scalp, it was found that the following amounts of desiccated thyroid were required at the various ages:

Six months	1½	grains	daily
One year	3½	"	"
Two years	5	"	"
Three years	8	"	"
Four years	8	"	"

This patient both walked and talked at fifteen months. In her case, in order to determine what the effects of the withdrawal of the treatment might be, the thyroid was discontinued. This was first attempted when she was two and one-half years of age. The mother was asked to keep close watch of her in order to detect the slightest difference in her behavior. After three days without thyroid it was noticed that the child became less active and disinclined to play. She was not irritable or cross, but would sit in her little chair the entire day. She had previously been very bright, active, and talkative. A few days later she ceased to talk voluntarily and answered only when spoken to. After twelve days without thyroid it was resumed, and her activity again returned. About one year later a similar trial was attempted with similar results, although the duration of the test was shorter, as the mother, who was a dispensary patient and had had the thyroid furnished her, purchased a bottle of tablets and gave them on her own responsibility. The child, now nine years old, is taking twelve grains daily. She is a normal, healthy school-girl, alive to all interests of girlhood, and no one in the village where she resides, outside of the family circle, knows that she is a cretin.

FIG. 60.—CRETIN, AFTER THIRTY-FOUR DAYS' THYROID TREATMENT.

STATUS LYMPHATICUS

Status lymphaticus is an unusual condition in which the lymphatic tissue throughout the body is in a state of hyperplasia. The condition is usually associated with marked rachitic manifestations. The chief interest attaching to the disease lies in the danger of sudden death of those so affected and in the danger from the administration of an anesthetic, particularly chloroform. The lymphatic glands and the thymus are the parts particularly involved. Laryngismus stridulus and thymic asthma are frequent manifestations of the condition. It may exist, however, without the occurrence of either. The nature of the condition is not known. The cases which I have seen, a considerable number, were all sufferers from chronic intestinal indigestion.

Illustrative Case.—In one case, a boy five months old—a most difficult feeding case—there were from twenty to thirty attacks of laryngismus stridulus in twenty-four hours. Two trained nurses were in constant attendance. The entire duration of the seizures covered a period of two months. The marked frequency of the attacks continued for less than a week. The boy eventually recovered. When he was four years of age I removed both tonsils and adenoids under ether anesthesia without any unfavorable effects from the anesthetic.

The most we can do with these patients is to improve their general condition along common-sense lines in relation to nutrition, rest, and exercise, as described in the section on The Delicate Child (page 148). Excitement and stress of any kind are to be avoided. In most instances the condition disappears under improved nutrition and a well-ordered life.

PURPURA

By purpura we understand that condition in which the blood, having escaped from its natural channels, becomes localized in different portions of the skin and subcutaneous tissue with no constant change in the character of the blood or demonstrable lesion in the vascular wall. Purpura associated with scorbutus and peliosis rheumatica has been referred to elsewhere. Among the other forms met with, the difference appears to be largely one of degree, and is due to toxic conditions of various kinds. It may occur late in an exhaustive disease. Petechiæ in the skin are frequently seen at the close of many of the exhaustive diseases, particularly in enterocolitis. Purpura may result from the administration of drugs.

Illustrative Cases.—One of my patients two years of age developed a mild purpura while taking large doses of antipyrin, which was being administered through a misunderstanding. In pyemia, purpura is not unusual. In a patient nineteen months of age, who died

from a septic sinus thrombosis with extension to the jugulars, there was extensive purpura for forty-eight hours before death. Blood examinations of this patient during life showed pure cultures of streptococci. Another patient, a boy eight years of age, previously healthy, died in three days from purpura fulminans (Henoch). In this case also, blood cultures made post mortem, from subcutaneous hemorrhagic areas, showed pure streptococci. In the severe forms of purpura the hemorrhage is not confined to the skin, but occurs from the mucous surfaces or in the viscera.

Treatment.—The treatment consists in establishing the vitality and resistance of the patient, in removing the cause when possible, and in the internal administration of acids and fruit-juices. The internal use of drugs, including the suprarenal extract and ergot, has not been of pronounced value in my cases. Calcium lactate in doses of two to five grains every three hours for children from tender age to puberty will be of more value than any other means of medication. In purpura fulminans the prognosis is necessarily very grave. When it develops in severe septic conditions or in prolonged exhausting diseases it is a symptom of much gravity. In these cases the free use of alcoholic stimulation should be resorted to early—one to two drams being given every two hours to a child five years of age.

HEMOPHILIA

Hemophilia is characterized by a tendency to uncontrollable bleeding following cuts and bruises. The cause of the condition has not yet been discovered. Various theories have been put forward from time to time. Heredity can be traced in most cases. Daughters of bleeders should not marry, as their offspring are likely to become bleeders, particularly the male offspring.

Illustrative Case.—My personal experience deals with but one case, a boy who was under my care the greater part of his life. The fact that he was a bleeder was first suggested through hemorrhages into the skin about the knee and arm which appeared as soon as he commenced to walk and to fall and bruise himself; in fact, he was brought to my clinic at the Babies' Hospital Dispensary because, as the mother expressed it, he was continually black and blue. In all other respects the child was normal; in fact, he was an unusually strong, well-developed boy. Bleeding nearly caused his death at different times during the second, third, and fourth years. A slight cut in the skin meant days of bleeding. One particularly severe and prolonged hemorrhage occurred as the result of a fall when a tooth pierced the lip. Having the boy under observation for a long time and the assistance of an intelligent mother, we had an opportunity to test the various means of medication and other methods of treatment as suggested by different authors. Suffice

it to say that all measures, both general and local, were without the slightest benefit. The only means of controlling the hemorrhage was by the use of strong pressure by means of pads and surgeon's adhesive plaster. The pressure had to be exerted not only over the bleeding area, but for several inches above it. The child passed from my care when about five years old, but I learned that he died soon after from the operation of circumcision, which was necessitated by the sloughing and sepsis of the foreskin.

The recent observations in the use of calcium lactate to prevent hemorrhage would suggest that there might be a field of usefulness for it in hemophilia.

INFECTIOUS FEVERS

INFLUENZA

The management of influenza in a child is very similar to that of measles. The disease in itself is rarely of sufficient severity to cause any great concern. The possibility of serious complications, however, is great; the younger the child, the greater the danger.

Treatment.—The disease is eminently contagious. Adults with influenza should not come in contact with younger members of the family. When one of a family of children is attacked, the child should be isolated as if he had measles or scarlet fever. The patient should be put on a reduced diet (see Diet in Illness, page 139), and an initial dose of castor oil or one grain of calomel in divided doses should be administered.

The temperature, which not infrequently reaches 104° F. or 105° F., is usually readily controlled by sponging with alcohol and water, one part alcohol and two parts water, at a temperature of 80° F. I have never been obliged to resort to the cool pack in grippe. This, of course, should be done if the temperature is not otherwise controlled.

The pain, the muscle soreness, and the restlessness are very much alleviated by the use of phenacetin, caffein, and bicarbonate of soda, given in powders as follows, to a child one year of age:

℞. Caffeinæ citratis.....gr. ij
Phenacetin.....gr. v
Sodii bicarbonatis.....gr. x
M. Div. et ft. chart. No. x.
Sig.—One every two hours—eight doses in twenty-four hours.

In older children, those from two to four years of age, the following may be used:

℞. Caffeinæ citratis.....gr. iij
Phenacetin.....gr. x
Sodii bicarbonatis.....gr. xx
M. Div. et ft. chart. No. x.
Sig.—One every two hours—not more than six doses in twenty-four hours.

After the fourth year, I have found it of advantage to give the salicylate of soda instead of the bicarbonate. This, for a child from five to eight years of age, will be as follows:

℞. Caffeinæ citratis.....gr. iij
Phenacetin.....gr. xv
Sodii salicylatis.....gr. xxx
M. Div. et ft. chart. No. x.
Sig.—One powder every two hours—a maximum of six doses in twenty-four hours.

The salicylate is best given in capsule form, as most children at this age may readily be taught to swallow a capsule.

So much for the medication of the uncomplicated grippe cases, the duration of which is usually from three to five days. Such cases occur in mild epidemics, in which the prominent symptoms are fever, loss of appetite, headache, prostration, and muscle soreness.

Illustrative Cases.—Two fatal cases of grippe in infants, in which the diagnosis was made by exclusion and verified by autopsy, occurred at the Country Branch of the New York Infant Asylum, during the winter of 1888 and 1889, which, it will be remembered, was the time when grippe first visited this country in epidemic form. These healthy, breast-fed babies were taken with the disease together with about forty other inmates—mothers and children—in one of the larger wards. The infants in question, aged three and four months respectively, were stricken suddenly with high fever and marked prostration. They quickly went into a condition of collapse and both died in less than thirty-six hours from the onset. The autopsy failed to show any pathologic change other than a slight hypostatic congestion of the lungs.

Complications.—The most frequent complication of grippe is bronchitis, and the most fatal complication is bronchopneumonia. Suppurative otitis is not an infrequent complication, or perhaps it would be better to class it as a grippe sequela. Among seventy-two cases of acute suppurative otitis, seen by me during the past two years, fifty-nine, or 81.9 percent, occurred with or followed immediately upon an attack of grippe. Patients who, after an attack of grippe, run a temperature without any apparent adequate cause, should always be examined by a skilled otologist.

Occasionally grippe is ushered in with pronounced gastric disturbance. There will be nausea and vomiting, no food being retained for from twenty-four to forty-eight hours. Pronounced intestinal disturbance is by no means an unusual evidence of infection with the influenza bacillus; there may be diarrhea without any evidence of involvement of the intestinal structure, or there may be a colitis with tenesmus and mucus and blood in the stools. In not a few cases the so-called complications are the only manifestations of the infection. This has led writers to describe a "grippe colitis," a "grippe gastritis," etc. I have seen two cases of endocarditis associated with grippe.

Regardless of the way in which we interpret these various conditions, one thing is to be remembered, that when the influenza bacillus plays an important part in the infection, the successful management of a case is rendered more difficult as relates to the ultimate recovery from, and the duration of, the illness. After a severe so-called grippe colitis, grippe bronchitis or pneumonia, the patient is left in a debil-

itated condition from which it may take weeks to recover. The quickest way to remove this indefinable "grippe spell" which rests over the patient is by a change of climate. Every late winter and early spring, I send a goodly number of children to Atlantic City. Two or three weeks there will do more to restore to health New York city patients than I am able to accomplish with drugs, baths, massage, and diet in an equal number of months at home. I have repeatedly seen children with tracheobronchitis with a nagging cough, which I had tried in vain to relieve, cease coughing within a very few days after reaching that resort.

The management of an otitis, pneumonia, bronchitis, or colitis, associated with or following an attack of influenza, differs in no way, so far as the immediate treatment of the complication is concerned, from that which would be advised if the case were independent of the influenza bacillus. The case as a whole, however, will require closer watching, and on account of the greater prostration will need better feeding and freer stimulation.

One attack of grippe confers no immunity upon the patient; in fact, cases appear to reinfect themselves. For this reason, I always advise that two rooms be used, one for the day and one for the night, the room not occupied during the day being aired for several hours with all the windows open. After recovery, the sick-rooms should be thoroughly aired, cleaned, and fumigated with sulphur or chlorin gas.

MALARIA

The presence of the plasmodium malaria in the blood in children should always be demonstrated before making a diagnosis of malaria, as in this way only can it be definitely determined that malaria exists. Aside from the periodicity in the temperature rise, there will usually be found in malaria an enlargement of the spleen; but beyond this the symptoms are vague and indefinite. The diagnosis of malaria is often made, and children are given quinin when the condition does not exist. According to my observation, a periodic rise in temperature which does not respond to quinin in full doses is not uncomplicated malaria. There are very few exceptions to this rule.

Children are very susceptible to fevers of a periodic type. Persistent intestinal infection, otitis, encapsulated pus in the pleural cavity, grippe infections, fatigue due to over-indulgence in play—any one of these conditions may give rise to an elevation of temperature more or less periodic in type, covering a considerable period.

Quinin Administration.—When it is demonstrated that malaria exists, quinin should be given in what might be considered large doses, if we are to use the adult for comparison. Children tolerate quinin well; in fact, to be effective, a much larger amount comparatively is required than in adults. In giving quinin to young children, care must be used in its administration lest it excite vomit-

ing. For this reason it should be given after meals in solution or in capsule. The best menstruum is a preparation of yerba santa known as yerbazine.[1] A child under eighteen months of age will require from eight to twelve grains daily. Two to three grains of the bisulphate should be given at a dose, not more than four doses being given in twenty-four hours.

When resident physician at The New York Infant Asylum, then located in southern Westchester County, New York, there was a great deal of malaria among the women and children inmates. In that institution I have repeatedly given infants under four months of age eight grains in twenty-four hours. In some cases at this age a larger quantity—ten to twelve grains—will be required. Quinin chocolate tablets are sometimes used in giving the drug to children. In using these tablets it must be remembered that the quinin in them is in the form of the tannate, and that one grain of the tannate represents about one-third of a grain of the sulphate. In order to give sufficient quinin in this form to be of value, the large amount of chocolate in the tablet is sure to upset the digestion. In children under one year of age with whom yerberzine may disagree because of the sugar which it contains, the bisulphate may be given in solution in distilled water, followed by a teaspoonful of orange-juice. In older children—those from two to six years of age—from fifteen to thirty grains daily will be necessary to control the disease. Here, as in the younger children, it is given in yerbazine unless the child can be taught to take a capsule, when it is given in three-grain doses at two-hour intervals until the prescribed daily amount has been taken.

The giving of a large dose of quinin a few hours preceding the expected chill does not answer well in children, as a large amount given at one time is liable to cause vomiting.

The use of quinin by inunction or by the rectum has not been satisfactory. Its use was so attempted at the Infant Asylum in a great many cases where difficulty was experienced in the stomach administration.

In but one case, aged two years, have I been obliged to resort to hypodermic medication. The child showed the tertian parasite, and the disease resisted the internal use of quinin in large doses, but responded promptly to the muriate of quinin given hypodermatically, seven grains being used at one injection. There was no abscess at the site of the injection and the child was permanently cured. To be sure, the administration of quinin was continued by the mouth, but the dosage of sixteen grains daily was now apparently effective where previously it had made no impression.

Recurrence.—The use of quinin in malaria should not be stopped abruptly with a cessation of the fever. It is my custom to give it in full doses for one week after the temperature fails to rise, unless

[1] Made by Lilly and Co.

there is a subnormal temperature, in which event it is reduced one-half or temporarily discontinued. It is a difficult matter to determine when a case of malaria is cured. Time and again I have supposed that a patient was well when a recurrence of the paroxysms took place weeks afterward. How much of this was due to reinfection, and how much to the old infection which had not been entirely eradicated, is difficult to say. I am inclined to the belief, however, that in many instances the plasmodium had remained inactive in the spleen in spite of its return to nearly its normal size, for the reason that the recurrence of symptoms sometimes took place coincident with some other illness with fever, such as tonsillitis or acute indigestion. My experience with recurrences of the disease has been such that after an attack of malaria I now direct that the child be given quinin for one week out of each month, for an indefinite time, at least for a year following the original attack. In a comparatively recent case, a girl five years of age had repeated attacks for two years before coming under my care. The mother was instructed to give the child twelve grains of the bisulphate daily for seven days out of each month. This, without a change of residence, was sufficient to prevent a recurrence during the fifteen months which followed.

TYPHOID FEVER

Typhoid fever is a rare disease in New York city children under two years of age. I have been able to prove but two cases in children under one year. One was ten, the other eight months of age. The diagnosis is often difficult because of the absence of the symptoms seen in the adult. The younger the child, the more likely is this to be the case. In neither of the above cases could we have been positive of typhoid without the aid of the Widal reaction. While usually the disease runs a shorter course in the child than in the adult, an attack means, at the least, several days of illness, and it may mean from three to six weeks. For this reason it is best to establish a sick-room régime, under which must be particularly considered the feeding, the bathing, the airing of the room, and absolute quiet for the patient. The bed-linen should be changed every day, and if the patient becomes very ill, but one attendant at a time should be in the sick-room.

Bathing.—The typhoid patient should be sponged twice a day, an ordinary cleansing bath being given. During the bath, it is not necessary to uncover the patient. Parts of the body may be bathed and dried, when other parts may be given attention.

Mouth Toilet.—Careful mouth toilet should be observed in typhoid fever in children. Gingivitis and ulcerative stomatitis with secondary cervical lymph-node involvement are not infrequent complications of these cases.

Care of the Discharges.—The discharges from both bladder

and intestine should be received in vessels containing a 1 : 1000 solution of bichlorid of mercury. Carbolic acid should not be used. The necessity for the attendants to wash their hands with soap and water after attending to the patient should be made very plain. They should also be advised as to the proper disposal of the discharges. In children of tender age who still require the napkin, it is best to dispense with the usual article and use cheese-cloth instead, several thicknesses of which may be made of the required shape and burned when soiled.

The Feeding of Typhoid Fever Cases.—Contrary to the general practice, I give little or no milk in typhoid cases. Early in my professional work I gave milk, which I had been taught was the only diet for the typhoid patient. I soon discovered that the less milk was given, the less the tympanites. I found that without milk the temperature ran lower, that there was less tendency to delirium, that the duration of the case was shorter and, as a whole, less severe. In fact, my observations bear out the teaching of Seibert, of New York, who was the first to advance the non-milk diet in typhoid fever.

The diet which I now use consists largely of gruels made from cracked wheat, barley, rice, oatmeal, or any of the uncooked cereals by boiling for three hours one ounce of the cereal in one pint of water. At the completion of the boiling, boiled water is added to make the quantity of the gruel one pint. If the gruel is too thick for drinking, boiled water may be added. The gruel thus prepared is used as a "stock." It may be given plain, with salt or with sugar or both. I frequently add, as flavoring, two or three ounces of chicken or mutton broth. From six to eight ounces of the gruel are given every three hours—five to six feedings in the twenty-four hours. The patient is encouraged to drink water, which is given between feedings. Lemonade, tea, and weak coffee may also be given between the feedings. In the event of abdominal distention under the carbohydrate diet, the gruel is dextrinized by the addition of "Cereo,"[1] one teaspoonful to a pint of gruel. The gruel should be at a temperature of about 140° F. when the Cereo is added. Rice which has been cooked over night and then boiled for four hours is given once or twice daily. It is best to serve it with plenty of butter and sugar.

When the temperature shows a tendency toward a lower level in or at the end of the third week, zwieback and toast are added to the diet. Later, when the tongue becomes clear and the breath loses its characteristic odor, kumyss, matzoon, skimmed milk, buttermilk, scraped rare beef, and soft-boiled eggs are allowed. With the use of the more substantial foods, the number of feedings in the twenty-four hours is reduced to four.

[1] Cereo Co., Tappan, New York.

Milk should not be given in any considerable amount before the temperature has been normal for one week. Even then, in a case which has had no milk or has had pronounced elevation of temperature and intestinal disturbance, the giving of milk may cause a rise in the temperature. In not a few cases in which the temperature was running a low course—from 100° to 102° F.—without tympanites or delirium, I have seen it shoot up to 105.5° F., with furred tongue and distended abdomen, as a result of the administration of milk, which was usually given at the solicitation of friends, who feared the patient was being starved!

Illustrative Case.—A few years ago a girl, twelve years of age, had typhoid fever. The temperature was not high, the range being from 101° to 103° F. In fact, fever and an enlarged spleen were the only signs of the disease, until the diagnosis was confirmed by a positive Widal reaction. The tongue was moist throughout, as is not unusual when milk is not given. The family were fearful that the patient was not being sufficiently nourished. The mother had been told by a physician, a family friend, that such was the case. She begged that I allow the girl one glass, eight ounces, of full milk daily. I immediately ordered the nurse to give the patient one glass of Walker-Gordon milk once in twenty-four hours. She did so, and in three hours after the first glass the temperature had risen to 106° F., with abdominal pain and distention. One bottle of the citrate of magnesia and a high enema were given, after which the disease resumed its usual course on the previous diet, without milk, the temperature not going above 99° F. after the seventeenth day. An uneventful convalescence followed.

Drugs.—With the so-called intestinal antiseptics in typhoid fever, my experience has been most unsatisfactory, so far as concerns their influence upon the disease. If there is constipation, the citrate of magnesia, from four to six ounces, given cold, is grateful to the patient and usually answers the purpose well. If the bowels do not move once in twenty-four hours, a high enema should be given. The digestive capacity is indicated by the condition of the tongue and may be improved by the use of dilute hydrochloric acid and the tincture of nux vomica. The following will be suitable for a child from five to ten years of age:

℞. Tincturæ nucis vomicæ.....gtt. xlviij
Acidi hydrochlorici diluti.....gtt. cxx
Glycerini.....℥iss
Aquæ destillatæ.....q. s. ad ℥iv
M. Sig.—One teaspoonful after each meal.

There may be as many as four bowel passages in twenty-four hours without harm to the patient. In fact, I consider from two to four necessary to maintain free drainage. When there are more than six in twenty-four hours, loose and watery in character, the loss of fluids sustained may be a serious factor in the case, in caus-

ing a concentration of the blood, with a corresponding concentration of the poison, as shown in the marked general toxemia.

Diarrhea in typhoid is best controlled by the use of opium combined with bismuth. For a child from three to five years of age, the following may be given:

℞. Pulveris Doveri.....gr. x
Bismuthi subnitratis.....gr. c
(Squibb)
M. Div. et ft. chart. No. x.
Sig.—One every three hours until the stools diminish in frequency, when they may be given at intervals of from six to twelve hours.

In children from one to three years old, the dose of the Dover's powder should be reduced one-half, the full amount of the bismuth being given. The amount required to keep the diarrhea under control will soon be learned. Of course, constipation must not be produced. If a free bowel action is interfered with, there will be increased prostration and higher temperature.

Control of the Fever.—A temperature at or below 104° F. is not interfered with, in the great majority of cases. Of course, a very delicate child with a weakened heart action may require the use of antipyretic measures before this temperature is reached. This necessity, however, is unusual. My observation is that when above 104° F. the patient does better if proper means are used to control the temperature.

Antipyretic Drugs.—Antipyretic drugs are rarely given. Quinin in my cases has never proved to be of the slightest value, even when given in large doses—fifteen or twenty grains in twenty-four hours—to a child five years of age. The coal-tar products, such as phenacetin, may be used in small doses without harm, if hydrotherapy is not applicable, as in a case which I recently saw in a remote country district. The patient was a boy six years of age. He was delirious at times, with almost constant tossing about the bed, sleeping but little, with a temperature ranging from 105° to 106° F. The disease was in the latter part of the second week and the patient was becoming rapidly exhausted. The parents, densely ignorant, refused to allow the bath or pack. The sponging, which was carried out indifferently, had not the slightest effect on the temperature and appeared to excite the patient. It was suggested to the attending physician that he give two grains of phenacetin and one-half grain of the citrate of caffein at intervals of from three to six hours. It was found that from four to six powders daily were required to keep the fever within the desired bounds and the skin moist. They had also a decidedly quieting effect upon the patient, whose heart action was in no way unfavorably influenced and who made a complete recovery. Had the great restlessness, the loss of sleep, and the delirium continued, I have no doubt but that there would have been a fatal termination.

While there is much truth in what has been written as to the depressing effects of the coal-tar products, and while the dangers from their excessive use are realized, there are occasions where they are a necessity, and I cannot help feeling that the dangers have been exaggerated. Probably the diseases in which their use is most dangerous are pneumonia and the inflammatory conditions of the heart.

Hydrotherapy.—Pyrexia is best controlled by hydrotherapy. Sponging with lukewarm or cool water may be tried, and if the case is not a severe one, this may answer. The child may be sponged with water at from 70° to 80° F. for one-half hour out of every two or three hours. Sponging, however, even if it controls the temperature, may not be the best means of using water for this purpose, for the reason that many children object to it, and in consequence the sponging disturbs them, increasing their irritability and reducing their vitality. The use of the bath for the reduction of fever in children I have discontinued. They invariably object to it, the bath excites or frightens them, and, as a rule, particularly in the very young and delicate, the reaction following it is poor. Moreover, the bath necessitates a great deal of handling, undressing and dressing, and therefore tires the patient. Reduction of the temperature by means of a rectal irrigation with cool water has its advocates. If the temperature is running high and intestinal lavage is indicated for reasons other than the temperature, it may be used here, the water being of a lower temperature than that of the body, though I never use it lower than 80° F. for this purpose. Without a high body-temperature, however, and other indications as well, it is never to be used. It causes straining, excites the child, and thus increases the danger of hemorrhage and perforation. Furthermore, it is a very indifferent antipyretic, even when used with water as cold as 75° F. By far the best means of reducing the temperature in children is the use of the cool pack (page 503). Its advantages are that it causes no fright or shock, the child being disturbed comparatively little by it. He may be placed in a towel, which has been wet with water at 95° F., and the only manipulation necessary is to turn him from side to side, so that the towel may be kept constantly wet with the cool water at the desired temperature. The pack more effectually controls the temperature than does either sponging or the tub-bath, and it is thus kept within the desired limits. As suggested elsewhere (see page 285), the child should be removed from the pack when his temperature reaches 102° F.

Heart Stimulants.—If the heart by the rapidity of its action shows signs of failure, the tincture of strophanthus is our best remedy. When there is irregularity in force and rhythm, strychnin should be used. A child from five to ten years of age may be given two drops of the tincture of strophanthus at intervals of from two to four hours. Strychnin, $\frac{1}{150}$ grain at intervals of from three to four hours, may be

given for the same age. Alcohol should not be given as a heart stimulant until other means have failed. It is a drug to be used only in conditions of great stress. Its function is to carry us over and out of difficult places, and it may be given in the form of whisky or brandy, one to three drams at intervals of from two to four hours in children from three to ten years of age. Its continued administration for a considerable period is not to be advised. In any disease it is difficult to lay down definite rules for the administration of heart stimulants. They are used with the hope of producing a definite effect, and when such effects are produced, a larger quantity should not be given. It is best always to begin with small doses and gradually increase until the desired results are apparent.

Hemorrhage and Perforation.—Hemorrhage has not occurred in any of my cases which were given the non-milk diet. Should it occur, the cold coil or the ice-bag should be applied and Dover's powder given in full doses to control peristalsis. In case of perforation, operative procedures are to be resorted to, but these hold out little hope. Children bear abdominal operations badly, and, considering the exhausted condition of a young child in the third or fourth week of a severe typhoid, the outlook is most unfavorable.

ERYSIPELAS

Erysipelas is a particularly fatal disease in infants. In the new-born, 95 percent of the cases are fatal. Fifty percent of my cases occurring in children under one year of age have been fatal. When the streptococcus of erysipelas gains entrance into the skin of an infant, it is unusual if the entire skin surface does not become involved before the process subsides. The long-continued high temperature, the toxemia, the discomfort from the inflammation, and the interference with nutrition greatly reduce the patient, and if he resists the disease during the acute stage he is very apt to die later from exhaustion. This was the outcome in four cases seen recently at the New York Infant Asylum, where each child went through the active period of the disease, but died a week or two afterward from exhaustion and marasmus.

Treatment.—The treatment is unsatisfactory, particularly so in young children—the younger the child, the graver the prognosis—and absolutely nothing is to be promised. I have employed scarifications in advance of the line of the slowly creeping inflammation, and whether solutions of the bichlorid of mercury, carbolic acid, or ichthyol were used as a dressing, I have seen the red line pass the scarified disinfected surface regardless of the nature of the antiseptic and regardless of the vigor and vitality of the child. The termination of the cases, whether in recovery or death, depends to a great extent upon the resistance of the patient and the severity of the infection,

so that our first step should be to place the child in the best position to resist the disease.

Hygiene.—One of the first, perhaps the most important factor in the treatment of these cases is abundance of fresh air. In the winter the child does best when placed in a room with windows wide open, not for a few moments but continuously. Protected with hot-water bags and sufficient clothing, there is no danger, as long as the temperature of the room does not fall below 55° F. At other seasons of the year the patients should, if possible, be kept out of doors.

Infants with erysipelas are particularly liable to develop gastro-enteric disorders. In case the child is bottle-fed, the milk mixture should at once be reduced from 50 to 75 percent by the addition of barley-water or Granum-water, No. 1, so that the amount of fluid given at a feeding remains unchanged.

Internal medication such as I have used has been of no value aside from its stimulating or sustaining nature. The tincture of the muriate of iron is not to be given young infants with erysipelas. It almost invariably disturbs the appetite and interferes with the digestion.

Local Applications.—The local measure which is unquestionably of some value is the use of ichthyol. I prefer a 10 percent solution, if the involved area is one or more of the extremities or a small portion of the trunk. Solutions as dressings should not be used in infants when the erysipelatous process involves the face or much of the trunk. When these parts are involved, a dressing of 30 percent ichthyol ointment in vaselin is applied on strips of lint or linen and renewed every three hours. The frequent renewal is important, and the ointment dressing should be used only on the acutely involved areas. When in a given case the inflammation begins to subside, the dressings should be removed and the parts bathed freely. It must be remembered in this connection that the skin is an important organ of excretion, particularly of carbon dioxid. The constant covering of comparatively large surfaces on a small child, interfering, as it does, with the function of the skin, may become a serious matter. The local treatment with ichthyol should follow up the extension of the inflammatory process and be continued until it subsides.

Stimulants.—Nearly every infant with erysipelas will require stimulation. For this purpose small doses of whisky well diluted appear to answer best. From five to fifteen drops at two-hour intervals for children under two years of age have aided me, I am sure, in carrying the patient through to a successful convalescence.

Erysipelas is the only disease in which it is wise to use alcohol as an early and oftentimes the only stimulant. When the inflammation subsides the child is by no means to be regarded as well. In the absence of sequelæ, such as a phlegmon, an endocarditis, or nephritis, the vitality may have become so reduced that sudden death may

take place when it is thought the patient is well on the road to recovery, such a result being due, perhaps, to an unrecognized myocarditis. During the entire attack and throughout convalescence the child should be fed to the limit of his digestive capacity, never beyond it. This can be done only by careful observation of the case and frequent inspection of the stools.

Vaccine Therapy.—The value of vaccine therapy in this disease remains to be proved (see page 530).

In the event of high temperature, above 104° F., the cool pack (page 503) may be effectively used.

RHEUMATISM

Rheumatism is an exceedingly rare disease in children under two years of age. It is occasionally seen in those between the second and fourth years and is of very frequent occurrence after the fourth year.

The manifestations of rheumatism in children are many. Probably its most frequent manifestation is in the catarrhal inflammatory conditions of the respiratory tract and in indefinite muscle pains, commonly known as growing pains. Inflammatory conditions of the upper respiratory tract, particularly such as relate to the mucous membrane of the throat and the tonsils, in a majority of instances are due, probably, to a rheumatic infection.

In children, involvement of the joints is also a result of rheumatic infection, but there is less tendency to joint involvement in them than in adults.

During the past twelve months I have had four cases of pleurisy with effusion of rheumatic origin.

Endocarditis is a frequent manifestation of rheumatism—a part of the disease and not a complication. Some of my most severe cases of endocarditis have shown the most trivial joint and muscle symptoms. In other cases there has been endocarditis without a single joint or muscle symptom. Usually those children of rheumatic inheritance whom we question closely, we shall find have had more than their share of tonsillitis and sore throat. It is the strong tendency to heart involvement in rheumatic children that should mark any child so affected as an object for special prophylactic care.

Children with growing pains or with respiratory indications of rheumatism, such as repeated bronchitis and asthma, with or without a pronounced rheumatic history, should receive prompt treatment for the condition. For although we believe the acute inflammatory involvement of the heart and joints to be of bacterial origin, nevertheless, before infection takes place, there must be a favorable field for the development of the specific bacteria, if there are such, to operate in. The peculiar condition of the blood and

tissues, that something which favors a fertile field for the specific bacteria, may be the result of heredity or of errors in living, particularly as relates to the diet. In any event, proper feeding and appropriate dietetic regulation will change this receptive state to one of apparent health. This is proved by the relief furnished to children who have suffered much from growing pains, and by a reduction of from 60 to 80 percent in the number of attacks during the year of inflammatory throat conditions.

It will usually be found that rheumatic children combine one or two, or perhaps all, of the following conditions: They have a rheumatic inheritance, they habitually indulge to excess in sweets—by which I mean sugar in any form—and a considerable part of their daily food is red meat.

Treatment.—*Diet.*—My first step in the management of a case of this nature is to eliminate red meat from the diet for ten days or two weeks. A minimum amount of sugar is given, just enough to make the food palatable. In a case which resists treatment, or when there is a rheumatic inheritance, saccharin is substituted for sugar. The child is encouraged to eat freely of green vegetables. The use of potatoes boiled with the skins on is encouraged. Fish, eggs, and poultry are allowed as usual. In order that the child may not suffer from the removal of a large amount of proteid from the diet, cereals and legumes rich in proteid are given. Particularly useful in this condition is plain oatmeal, which, of course, should be cooked three hours. Dried peas, beans, and lentils are given in the form of a purée.

Drugs.—In addition to these changes in the diet, a child of from five to ten years of age is given ten grains of bicarbonate of soda, three hours after breakfast and dinner for one week, and five grains three hours after each meal for the second week, after which time he is given five grains of the bicarbonate of soda twice daily for five days, with a ten-day intermission, when the dosage is repeated. For six weeks the soda is used in this way—for five days with ten days' intermission. The low sugar and the low meat diet should be continued indefinitely if there is a rheumatic history, or if the child has had repeated rheumatic attacks, whether such manifestations have been in the throat, in the muscles, or in the joints. The mother should be instructed to resume the bicarbonate of soda with the first complaint of pain on the part of the child. If the growing pains continue in spite of the diet and the bicarbonate of soda, five grains of the salicylate of soda should be given after each meal, the use of the bicarbonate being continued. It is not wise to continue the salicylate after the acute symptoms have subsided.

Children who are subject to frequent attacks of rhinitis, tonsillitis, and angina, with or without a rheumatic history, should indulge

sparingly in red meat, never more than once a day, better every second day. Only sufficient sugar to make the food palatable should be allowed. The use of candy should be reserved for very rare occasions. A warm bath should be given at night, followed by a generous friction of the skin in drying.

Illustrative Case.—Asthmatic bronchitis is usually dependent upon the rheumatic state. Repeated attacks suggest the probability of their being of rheumatic origin. A little girl eight years old was brought to my office about a year ago, because of repeated attacks of bronchitis. The mother, a woman of unusual education and refinement, stated that the child had had an average of two attacks of bronchitis monthly during the previous year, and at least one every month since she was five years of age. On my expressing some doubt as to the frequency, she stoutly maintained that her statement was correct. The family lived in Brooklyn and had been told that the child could not remain there during any portion of the year. She had spent the colder months at different winter resorts, with very little, if any, resultant effect upon the severity or frequency of the attacks. The child was pale and inclined to stoutness. There had been no other illness of consequence. The attacks were peculiar in that they were of short duration but very severe. There usually was a temperature range from 100° to 101° F. There were cough and difficulty in breathing with occasional attacks of marked air hunger. The attacks were always accompanied by severe coryza. She came to me at the end of an attack. An examination of the chest showed throughout a fairly even distribution of mucous râles, involving the smaller tubes. Aside from the bronchitis and secondary anemia, the examination was negative. The child had attended school at irregular intervals, but only for a few weeks of her life. While getting the history, I asked, as a matter of routine, if the child snored or if she were a mouth-breather. This caused the mother to remark that the child had been under the care of throat specialists at different times and each of them had removed a set of tonsils and a set of adenoids! She did not think that there was very much left. In spite of a normal rhinopharynx, the colds had continued. There was not a sign of a tonsil and the nasopharynx was free. In taking the family history, I had learned that it was rheumatic on both sides, extending back for two or three generations. The mother claimed to have suffered a great deal from rheumatism. In getting the personal history, I asked if the child was fond of red meat. The reply was that she lived on it, and cared for little else, unless it was sugar. Here was a girl eight years of age who would not drink milk until sugar had been added to it. Cereals, stewed and raw fruits were loaded down with sugar before she would touch them.

In my instructions as to the treatment, red meat was allowed

once every second day and sugar was reduced to a minimum—probably not more than one-fifth the usual amount being given. She was to be bribed, if necessary, to eat green vegetables, cereals, and fruits. Expectorant and cough mixtures were discontinued. She was given twenty grains of the bicarbonate of soda and twenty grains of the salicylate of soda daily for three weeks. Later, the drug treatment was continued at intervals during the remainder of the winter. She passed through the following winter without a sign of rhinitis, bronchitis, or asthma, although she continued to live in Brooklyn.

Another case somewhat similar was sent to me by a well-known rhinologist. The girl, seven years old, had suffered from repeated attacks of bronchitis and asthma. She had been confined to her home a greater part of each winter. Her general condition was thoroughly wretched. Her family physician attributed the condition to enlarged tonsils and adenoids. The child was sent to New York for operation. The operation was performed and the child returned to her home. As a result the patient could breathe easier and sleep better, and suffered much less during her attacks of asthmatic bronchitis; but the frequency of the attacks was in no way affected. Early the following summer, they returned to the rhinologist, who, finding the condition of the upper respiratory tract satisfactory, asked me to take charge of the case, remarking that he had "cut everything in sight and out of sight"! The child, as did the other referred to, proved to be an excessive meat and sugar eater, and, moreover, the mother's family was rheumatic. The treatment outlined above was instituted; and, while the results were not so flattering, the condition was much improved; only three attacks occurred during the next twelve months, and the child gained fifteen pounds in weight.

Repeated inflammatory involvement of the mucous membrane of the upper respiratory tract in children, in the absence of enlarged tonsils and adenoids, suggests strongly a rheumatic element as a prominent causative factor. Rheumatic pleurisy requires the same treatment as rheumatism. In my four cases referred to above there was a rheumatic history in two. The children were between two and six years of age. There was no pneumonia, no lung involvement of any nature. Aspiration showed clear fluid, which, upon examination, proved sterile. The children were given an anti-rheumatic diet with the salicylate and the bicarbonate of soda in doses suitable for their ages, with the result that in all there was a complete absorption of the fluid in less than one week. The treatment of rheumatic endocarditis will be found elsewhere (page 305).

Treatment.—*Diet.*—Acute articular rheumatism or rheumatic fever is rarely seen in children under three years of age. It is usually

the larger joints that are involved—the shoulder, the elbow, the knee, or the ankle. The lesion may be single or multiple. Rest in bed is an absolute necessity. The diet of the patient may consist of milk, junket, gruel, toast, stale bread, weak tea, stewed fruit, and orange-juice. Vichy and lemonade may be given to drink. There should be one evacuation of the bowels daily.

Local Measures.—Considerable comfort may be furnished by local measures, which will permit the child to sleep, resulting in a much improved food capacity. The affected joint or joints should be comfortably supported on a cushion or pillow, and the parts kept well protected by cotton-wool or flannel dressings. The U. S. P. lead and opium solution which is used to moisten the gauze dressings will aid in relieving the pain. The joint is loosely wrapped in strips of linen which have been wet with the warm solution. Over this is placed oiled silk to prevent rapid evaporation and over all a flannel bandage is wrapped. In the acute cases the dressing should be changed every hour until the pain is relieved. This can readily be done without disturbing the patient. A liniment composed of menthol, two drams, tincture of opium, one and one-half ounces, and enough alcohol to make six ounces, applied on strips of linen and covered with oiled silk, is another form of local treatment which has been of considerable service in relieving pain. The dressing should be renewed every two or three hours if the case requires it.

Drugs.—Various drugs, such as oil of wintergreen, aspirin, and combinations of the alkalies with the salicylates, have been used in a considerable number of cases. The most effective internal medication has been the bicarbonate in association with the salicylate of soda. The salicylate must be given in large doses. Two points, however, are to be kept in mind in the use of large doses of salicylate in children: Their depressing effect upon the heart, and their tendency to produce derangement of digestion, as evidenced by nausea and vomiting. The salicylate should never be given with the stomach empty. It is given to the best advantage after meals, and always in solution. For a child five years of age, the following may be prescribed:

℞. Sodii salicylatis.....ʒij
Elixiris simplicis.....ʒlss
Aquæ.....q. s. ad ʒiv
Sig.—One teaspoonful four times daily after meals, in plain water or in Vichy.

There are about twenty-four teaspoonfuls in a four-ounce bottle. The average teaspoonful, as is well known, holds more than one dram. Computing twenty-four doses to a four-ounce mixture, we give this five-year-old patient twenty grains of salicylate of soda in twenty-four hours. The amount may be increased to thirty

grains if the condition is serious. Larger doses than thirty grains to children of this age I do not consider safe, as I have seen such doses followed by irregularity of the heart's action and cyanosis. The average child from eight to ten years of age will take thirty grains daily without inconvenience. From the second to the third year, I have given from twelve to fifteen grains repeatedly, with most satisfactory results. The bicarbonate of soda may be given in combination with the salicylate, but it is best given alone in Vichy or carbonic water between meals. For a child five years old or under, twenty grains should be given in twenty-four hours. In children from seven to ten years of age, thirty to forty grains daily is the amount required. During an attack of rheumatic fever, the patient's heart should be examined daily. The dosage both of the salicylate and the bicarbonate of soda should gradually be reduced, as the condition of the child improves.

It is my custom never, willingly, to let a child who has once had an attack of acute articular rheumatism disappear from my observation. With repeated attacks, endocarditis is liable to develop sooner or later. After one attack, the parents are advised as to the probability of a recurrence, and its dangers are pointed out to them. They are instructed to keep the child on a low meat-and-sugar diet—red meat never being allowed oftener than once every second day, while sugar is given only in sufficient quantity to make the food palatable. Five days out of every fifteen, ten grains of the salicylate of soda, separately or combined with ten grains of the bicarbonate, are given daily. This should be continued for six months, when the five-day treatment out of each month will suffice. In some cases I have continued this method indefinitely.

At the present time a boy eleven years old, who has had two attacks of rheumatic endocarditis, is taking ten grains of each of the above drugs daily for one week out of each month, and has been doing so for two years. He comes of a long line of rheumatic ancestry, and so prominent is the rheumatic element in him, that he frequently has attacks of angina and muscle pain in spite of the diet and the above prophylactic treatment.

PELIOSIS RHEUMATICA

In this unusual affection, which appears to be of rheumatic origin, purpura is a prominent symptom. In my patients the purpuric area has always been over the anterior portion of the lower extremities. My cases, five in number, have all occurred in those who had had previous attacks of rheumatism or chorea, or in those in whom the rheumatic element was prominent, as shown by recurrent tonsillitis or recurrent bronchitis. A further proof of the rheumatic origin of the disease is the fact that the cases usually yield readily to treatment for rheumatism.

In one of my patients there were two distinct attacks, both of which yielded fairly well to the salicylate of soda and the iodid of potash. The medication and diet are the same as that suggested for rheumatism. In case erythema nodosum is present at the same time, local measures for the relief of pain (page 432) will be necessary.

ACUTE GENERAL PERITONITIS

This disease is not an infrequent one in young children. I have seen four cases during the past year. Two were associated with scarlet fever and two with enterocolitis. Perforation of the intestine and trauma may cause peritonitis, as in the adult. The most frequent cause, however, is the invasion of the peritoneum by pathogenic bacteria. The peritoneum in young children appears to be particularly susceptible to various forms of infection. Three symptoms were present in my cases—persistent vomiting, marked abdominal distention, and constipation. Pain was absent in one case and not marked in some of the others. The pulse in all was small and rapid. The constipation was as obstinate as though actual obstruction existed.

The medical treatment in my experience has been without value. Every case has resulted fatally. In the majority, surgeons were called in consultation, but invariably advised against operative procedures.

Never having had a case recover, I am not in a position to advise treatment.

Illustrative Case.—A strong vigorous girl, three years of age, developed a moderately severe entero-colitis. Response to treatment was fairly prompt, and in ten days the child was convalescent. Suddenly there was marked distention of the abdomen, persistent vomiting, and obstinate constipation. These symptoms, with gradually increasing prostration, continued for three days, until the child died. The autopsy showed an acute general streptococcic peritonitis. Streptococcus was found in the enlarged mesenteric glands, proving that the intestinal tract was the source of the infection.

In another case, an infant of six months, the pneumococcus in pure culture was found as the infecting agent.

TUBERCULOUS PERITONITIS

In tuberculous involvement of the peritoneum the disease is usually well advanced by the time it comes into the hands of the pediatrist. The chief question that concerns us at the present time is as to the advisability of the operation of laparotomy.

When to Operate.—My course is as follows: If there is marked ascites with much discomfort, operation is advised at once. It would seem that early operation furnishes the best chance for recovery in the actively acute cases. When there is evidence of in-

terference with normal peristalsis, as indicated by persistent constipation and visible peristalsis, it means that intestinal obstruction is imminent, and immediate laparotomy is advised. When the above conditions do not obtain, I have found it advisable to postpone operation and attempt to relieve the patient by hygienic measures, diet, and medication.

Some of the cases seen by me were absolutely hopeless at the time, showing marked tuberculous processes elsewhere, and therefore were not considered fit subjects for operation. In the non-surgical treatment of these cases the chief points of importance to be considered are nutrition, fresh air, and a thorough daily bowel evacuation.

As long as there is a temperature above 100° F. or abdominal pain, the patient should be kept in a recumbent position and out of doors. Moderate exercise is to be encouraged as soon as the conditions allow. The same methods of constitutional treatment as to diet and climate are to be followed out as are laid down in the treatment of Pulmonary Tuberculosis (page 299). The patient should be weighed once a week, and in case of a continuous loss in weight and strength extending over five or six weeks, with or without fever, in spite of the advantage of diet and climate, operation is advised, regardless of the stage of the process, provided always there is no active tuberculous process elsewhere. When the weight remains stationary or nearly so for two or three months, laparotomy is advised. In the event of improvement and gain in weight, the expectant treatment is continued.

Illustrative Case.—The necessity for operation cannot always be convincingly impressed upon the parents. A few years ago the condition of a private case, a boy three years of age, was persistently bad. There was moderate fever, emaciation to a marked degree, with later, tubercular involvement of two of the dorsal vertebræ. Laparotomy was suggested early in the illness, but it was refused, and the child after a prolonged illness made a complete recovery both from the tuberculous peritonitis and the tuberculous caries of the vertebræ. In this case I am convinced that an unnecessary risk was taken, and that recovery from the peritonitis would have been much more rapid and the vertebral involvement probably prevented by an early laparotomy.

DACTYLITIS

Dactylitis consists of a fusiform swelling on one or more of the phalanges of the fingers. It may be of two forms, *dactylitis syphilitica* and *dactylitis tuberculosa*. The differentiation between the two conditions is oftentimes most difficult. In the syphilitic type the lesions are more apt to be multiple and are associated with syphilitic lesions elsewhere. Furthermore, these cases are favorably

influenced by anti-syphilitic treatment, which is not the case with the tuberculous form.

Aside from the anti-syphilitic treatment, the management of the two forms is the same. Absolute rest to the parts appears to be essential for successful treatment. This is best secured by the use of splints, which must be kept bound on the fingers for months in such a way as effectually to immobilize them. In a recent case of the tuberculous form, successfully treated in this way, the finger was kept in splints for six months. When abscess and necrosis occur, the case must be treated along surgical lines, the immobility of the parts being maintained as completely as the conditions allow.

TUBERCULOUS BONE DISEASE

Children afflicted with tuberculous bone disease, whether in the spine, the hip-joint, the knee-joint, or elsewhere, should be in the hands of the general or orthopedic surgeon. The constitutional treatment of these cases, however, is most important, and is largely along nutritional and hygienic lines, for the better the nutrition and the physical condition of the patient, the more complete and prompt will be the results of the surgeon's efforts.

Diet.—A tuberculous child should receive a generous amount of fat and nitrogenous food. There should be no forced feeding, as this almost invariably makes the child ill, or he will become disgusted with all food. What is required is a liberal supply of properly selected, properly prepared food. The diet advocated in the Tardy Malnutrition cases and in Pulmonary Tuberculosis should be employed here. The five meals a day which are often advocated for tuberculous children, I have been unable to give with advantage. The most frequent feedings that I have been able to give with benefit for children of three years or over are the three daily meals, with a glass of milk or cocoa in the middle of the afternoon. As much outdoor life as is possible should be afforded the patient. City children always improve more rapidly when placed in good surroundings in the country.

GLANDULAR FEVER

Glandular fever is usually seen in children after the first year. The disease is due to a local infection the nature of which is unknown. The lymph-nodes at the angle of the jaw are involved, forming an elongated tumor between the angle of the jaw and the sterno-mastoid which may reach a considerable size. I have seen cases during the past winter in which the tumors were as large as hens' eggs. Both sides are usually involved; the swelling is first noticed on one side, which is often followed by an enlargement of the glands on the opposite side.

The symptoms are fever, usually from 101° to 104° F., prostration, and loss of appetite. The disease is to be differentiated from

mumps in that the parotid glands are not involved, and from acute simple adenitis by the absence of throat involvement, and in the fact that nearly all cases recover without suppuration or resulting persistent adenitis. In several of the cases seen during the winter and spring of 1906 the rhinopharynx was normal.

The treatment consists in the continuous use of ice-bags or the cold compress (page 333), and laxatives, such as milk of magnesia or citrate of magnesia, sufficient to produce one or two evacuations daily, a reduced diet of broths and gruels, and keeping the patient in bed. The swelling may last from five days to two weeks, and in my cases has subsided without suppuration.

CYCLIC VOMITING

Recurrent attacks of persistent vomiting are frequently seen by the pediatrist. An attack comes on suddenly with little or no warning. At first the contents of the stomach are vomited; later, in many cases, whatever may be taken in the line of food or drink. When no food is taken, the dry retching and vomiting of mucus continue, the latter for a few hours, for an entire day, or for several days. The most prolonged case under my observation was in a boy three years of age, who vomited persistently for thirteen days. The cessation of the vomiting is usually as abrupt as its onset, the patient asking for and retaining the nourishment which is given him. If the attack is a short one and mild in character, the customary diet will usually be taken at once thereafter without inconvenience. If the attack has been prolonged, with much straining and vomiting of mucus streaked with blood, or if there has been a decided hematemesis, which I have seen in some cases, the resumption of the feeding will necessitate considerable care. In such cases broths, kumyss, and bland non-irritating articles of diet generally will have to be given.

Treatment.—According to my observation direct medication to the stomach during the attack is valueless. Our efforts are best exerted in maintaining the nutrition of the patient. All attempts at supplying water or food by the stomach should be discontinued. Nutrient enemata and colon flushings are invaluable in all of the prolonged cases—those lasting over forty-eight hours. In addition to the discomfort produced by the vomiting, these patients suffer greatly from thirst. The necessary amount of fluid can be supplied by colon flushings. For a child five years of age one pint of normal salt solution may be introduced into the colon through an ordinary rectal tube (page 219). I have often known patients to retain as much as two pints of fluid a day when it was thus given. If the case promises to last more than three days, it is best to begin with nutrient enemata on the third or fourth day. For this purpose I employ from six to eight ounces of completely peptonized skimmed milk, to which

the whites of two eggs have been added. This is given at eight-hour intervals. The use of the salt solution and peptonized milk furnishes sufficient fluid nutriment to sustain the child until the vomiting ceases. In two cases only have I been obliged to resort to morphin hypodermatically, to control the frequency and violence of the vomiting attacks.

All of my cases of cyclic vomiting—and I have treated over thirty of them—have been without exception in children of rheumatic inheritance or in those in whom rheumatism was evident by some unmistakable sign. It is therefore of great advantage to consider these cases and treat them as though they were of rheumatic origin. The attacks, perhaps, may not be entirely prevented, but in practically every case they may be delayed by putting the patient upon suitable treatment in the intervals. My custom is to give only a limited amount of animal proteid and a diet scanty in sugar or with sugar entirely excluded if the case is a severe one. The use of green vegetables, fruits, and cereals and milk is encouraged.

To a child of from three to ten years of age, from nine to twelve grains of salicylate of soda or aspirin are given after meals daily in divided doses, for five days out of every fifteen. During the ten days of rest from the salicylate, five grains of bicarbonate of soda are given twice daily between meals. This scheme of treatment is continued for months. If the salicylate of soda interferes with digestion or with the appetite, aspirin in equal dosage is substituted. By following this method of treatment in cases where attacks had been occurring every month or six weeks, the intervals between them have been increased to six months or a year, and in several instances the attacks have entirely ceased. Spasmodic treatment of these cases is of little value; only persistent treatment is effective, and there must be confidence and coöperation on the part of the family or any treatment will fail.

TEMPERATURE IN CHILDREN

Normal Temperature.—The question is often asked: What is the normal temperature of a baby or young child of a given age? In order to answer this question from our own observation, a study of the matter was carried out at my suggestion by Dr. H. G. Myers, resident physician at The New York Infant Asylum. This study comprises fifty-nine cases, the ages varying from birth to one year. Only well children were selected for the observation, the majority being breast-fed. The temperatures in each instance were taken by the rectum for four minutes.

It was found in these infants that the birth temperature ranged from 96° to 98° F., exceeding 98° F. in but five cases, when it was between 98° and 99° F. In one it was 94° F. During the twenty-four hours following birth there was a rise in the temperature usually of about one degree. From this time on, there was little variation in the temperature, when the child was well, regardless of the age. There would be a variation at different times of the day of a fraction of a degree, it being higher in the evening. Upon looking over the charts upon which the results were chronicled, one is impressed by the uniformity of the temperature, ranging, as it does, within fairly narrow limits, from 98° to 99.2° F.

Instances when the temperature arose to 99.5° F. were occasionally seen, but 100° F. was very unusual. It is not claimed that the temperature of a well child may not reach 100° F.; in fact, there were occasions when it rose to 101° F. and illness could not be proved, and had not the temperature been taken for the purpose above mentioned, no elevation would have been suspected, for when next taken the temperature was normal. In those cases in which a rise was proved to be an early sign of illness, the recording of the temperature was discontinued and the first reading was not included in the observations. In one child a temperature of 103° F. was found. It remained at this point for three hours, when it fell to normal without any other manifestation of trouble. When, however, the thermometer registered over 99.5° F., some cause for the elevation could usually be discovered; though it may have been nothing more than excitement or a slight indigestion.

Several years ago I personally made a similar series of observations at the Country Branch of The New York Infant Asylum in twenty-five healthy children under eighteen months of age. The temperatures were taken four times a day, the observations extending over an entire week. It was found in these well children that the

temperature varied from 98° to 99° F.; when it rose every day above 99.5° F., some abnormal condition was always found to explain it.

Judging from these observations in seventy-four well children, ranging in age from birth to eighteen months, whose temperatures were taken several hundred times, it would seem that a daily rise above 99.5°, F. may be considered abnormal. An occasional rise, however, considerably higher than this, as above mentioned, may occur and does occur in perfectly healthy children, without being of any special significance.

Fever.—By fever, then, in infants and children we understand an increase above that which is considered the normal body-temperature.

In children, for clinical purposes, the rectal temperature should always be taken. For those under five years of age the mouth is unsafe, because the child is apt to bite off the thermometer bulb, and unreliable, because the lips will not remain closed the requisite three or four minutes. The axillary temperature is thoroughly misleading and should never be depended upon. Thermometers should be carefully disinfected with alcohol after using. One-minute thermometers, according to my observations, are often unreliable and should not be used.

The highest temperature personally known to the writer was 111° F. This was as high as the thermometer could register. It occurred in a child of ten months who was in a convulsion, which was one of the first symptoms of a tuberculous meningitis. The child had been placed by the parents in water at a temperature of 115° F. It had been in the water about ten minutes before the rectal temperature was taken. How much the temperature was due to the illness and how much to the hot water will never be known. The temperature responded promptly to a cold bath. The child never regained consciousness and died of meningitis ten days after the initial convulsion.

Fever may or may not be an index of the gravity of a disease; thus we frequently have a temperature ranging from 103° to 105° F. in tonsillitis, acute indigestion, and stomatitis—ailments which respond very quickly to treatment and which present no serious aspects. In typhoid fever, pneumonia, scarlet fever, and diphtheria, however, when the temperature range is above 104° F., it is a symptom of considerable value, as indicating the severity of the infection; so that it is not the fever itself, but the condition back of and associated with it, which makes it a sign of clinical value. In pneumonia, children bear a comparatively high temperature, 104° F., for example, without much discomfort or danger; while in the acute intestinal disorders of summer, an equal degree of fever is borne very badly, and if continued is of grave significance. This must be kept in mind in our dealings with fever.

When is a given temperature to be interfered with? is a ques-

tion which concerns all practitioners. This depends to a great extent upon the cause of the fever and its effects upon the patient. If the fever produces diminished assimilation, loss of sleep, irritability, and restlessness, it will do the child harm by diminishing the normal resistance to disease, and should be relieved whether it is 102° F. or 105° F. It will thus be seen that interference is dependent not so much upon the height of the temperature as upon its effects upon the patient.

The methods of relieving fever are: (1) *Elimination:* This applies particularly to the gastro-enteric tract and the skin. In a majority of the cases of high fever due to an acute indigestion with resulting toxemia, a purgation, a bowel-washing, and a carefully adjusted diet for a day or two, and the case is well. We remove the cause of a fever, and the fever subsides. Unfortunately, this means of controlling fever is limited to the gastro-enteric tract. (2) *Diaphoresis*, by which is understood the production of an excessive perspiration, will also relieve high temperature. The most reliable way of bringing this about in a child is by the use of moderately heavy covering and the administration of the tincture of aconite, in doses of one-half to one drop every hour,—eight doses in twenty-four hours; or liquor ammonii acetatis, two drams every two hours, for a child one year old. (3) *Hydrotherapy:* By far the most satisfactory means of controlling fever depends upon the local abstraction of heat by means of *sponging* (page 502), *tub-baths* (page 30), and *cool packs* (page 503). (4) *Antipyretic drugs:* Much which borders on the sensational has been written about the harmfulness of antipyretic drugs, particularly the coal-tar products. Used in large and frequent doses, they certainly may do a great deal of damage; under certain conditions, used in small doses and repeated at intervals of from three to six hours, they may be and often are of benefit. Aconite and the liquor ammonii acetatis are of some value, as above stated, but they are of little value in controlling a very high persistent temperature. The coal-tar products furnish the best antipyretic drugs and may be used with safety, but should be used only when, for any reason, the local abstraction of heat by the application of cold is impossible. In many families there is too little intelligence to make a cold pack either possible or safe. In severe cases of pneumonia and scarlet fever, and in the intestinal diseases, sponging often will not answer. Only a trained nurse or a very intelligent mother should be entrusted with a pack. Moreover, sponging and tub-bathing, if repeated too frequently, particularly during the night, exhaust the child. Spongings or tub-baths are often strenuously objected to by parents as well as by the patient, and if the nurse is one of the family, her sympathy will counterbalance her judgment, and the result be far from satisfactory. Under such conditions, when the application of cold to the skin

is impossible, a combination of phenacetin and caffein, alone or with Dover's powder, has proved effective. The antipyretic treatment of scarlet fever is the same as that of pneumonia or typhoid fever.

My use of antipyretic drugs has been confined almost entirely to the ignorant in private work, and to dispensary patients. For a child of one year or under, one grain of phenacetin with one-fourth grain of citrate of caffein may be given and repeated at three-hour intervals if the temperature requires it. For a child two years of age 1½ grain of phenacetin and ½ grain of citrate of caffein at three-hour intervals; three years and over, 1½ to 2½ grains of phenacetin with ½ to 1 grain of citrate of caffein, at intervals of from three to six hours. If there is much restlessness and irritability which is not thus controlled, Dover's powder may be added—¼ grain to each dose, for a child of from three to six months of age; ½ grain between six and twelve months; one grain after the age of two years is reached. It is always wise to caution parents as to the use of Dover's powder in children. They should be told that if the child becomes "heavy," or difficult to arouse, the powders must be discontinued. That phenacetin and citrate of caffein cannot be given in solution is unfortunate. Like all insoluble powders, they are best given in some mucilaginous mixture, such as barley-water or one of the cereal jellies. Fruit-juice or apple-sauce usually answers well. Antipyrin, for the reason that it forms a tasteless mixture with water, succeeds better with some intractable children, and may be used in the same doses as phenacetin; although as an antipyretic it is less efficient.

OBSCURE ELEVATIONS OF TEMPERATURE

Perhaps the most annoying cases in pediatric work are those with an elevation of the temperature for which no adequate cause can be discovered. In the section on Normal Temperature certain possible variations are given which I regard as within the limits of health. When these boundaries are passed, when there is a temperature range between 99° and 101° or 102° F., or a temperature persistently at 100° or 101° F. without any apparent cause, and continuing for days and weeks, the medical adviser is not in an enviable situation. Such cases coming to the pediatrist through consultation or otherwise are sometimes easy of solution. At other times, however, the cause of the fever may never be discovered, and the patient eventually gets well, leaving us still in ignorance of the cause of the fever.

Active Exercise in Nervous Children.—This is not infrequently the cause of an elevation of the temperature. I have seen several cases of this nature. A few years ago I saw in consultation a country child three years of age, whose temperature every afternoon at one

o'clock was 102° F. The child, while not vigorous, showed no signs of illness. He ate well, slept well, and played hard. There was a slow gain in weight. The fever was discovered by the mother, who thought that the child, who was a blonde, looked flushed every day at about the same time. The temperature by rectum was normal in the morning and normal at night. This condition, to the attending physician's knowledge, had persisted for six weeks before I saw the patient. How long there had been a daily elevation of the temperature above the normal before the mother discovered it, we have no means of knowing. The doctor, an excellent practitioner, had suspected, examined the child for, and treated him for various diseases; the first being malaria, with no response to quinin; then typhoid fever, as by suggestion and constant inquiry the child came to imagine that he must be sick, and complained of languor. The fever continued, however, beyond the usual time allowance for typhoid fever and there were no other symptoms. There was no enlargement of the spleen and the blood had been repeatedly found negative to the Widal reaction. Other possible causes of the fever were also given attention. One day the doctor suggested tuberculosis. This aroused the family and friends and a consultation was the immediate result. In company with the doctor, I saw the child at its home. I found a rather thin blond boy, three years old. The family history was excellent. There was one other child, six years of age, who was well and a good specimen of robust boyhood. The patient had never had a pulmonary disorder and no disease of the respiratory tract other than slight bronchitis. There was no apparent association of the condition with any intestinal or infectious disease. An exhaustive physical examination failed to reveal any abnormality other than a small umbilical hernia and a slight enlargement of the inguinal and submaxillary glands. The blood was not examined. The child was pale and doubtless a blood examination would have revealed a mild secondary anemia. The appetite was fairly good; the bowels were reported regular and his stools normal. The child had not been kept in bed, as the family did not consider him very ill. The physical examination being negative, I questioned the mother very closely as to the child's habits of life. I found that he rose at 7 A. M., had breakfast at 7.30, played with his big brother and two older boys until one o'clock, when he had dinner. A glass of milk and a piece of bread and butter were given as a luncheon at 11 A. M. I found that he played very actively, kept up with the older boys, and was unhappy when he was not with them. Attempts had been made without success to entertain him with less strenuous play. It was at midday, sometimes before, sometimes after dinner, that the temperature reached the highest point. It seemed to me that here, probably, was a case of fatigue temperature.

I accordingly suggested that the boy be undressed and put to bed at 11.15 A. M. after the light luncheon and be made to rest and sleep if possible. At 1.15 he was to be taken up for dinner, his temperature first being taken. These instructions were faithfully carried out, and I am pleased to state that this ended the daily rise in temperature. The case was one of an active, nervous child becoming overtired in his attempts to hold his own with older and stronger boys. The patient improved rapidly in his physical condition and is now, after an interval of three years, perfectly well.

Another child, four years of age, was seen in consultation with a New York physician, because of a daily elevation of the temperature to from 100° to 102.5° F., which had continued for six weeks. The child was thriving and otherwise perfectly well. No cause of the fever could be discovered in his physical condition. He had a noisy, excitable nurse, who was inclined to exciting games and rough play with the boy. With a dismissal of the nurse the fever ceased.

Otitis.—Persistent fever, following the acute catarrhal affections of the upper respiratory tract and the exanthemata, is sometimes explained by a suppurative process in the middle ear, without other symptoms than the fever.

Encysted Empyema.—A small area of encysted empyema may explain a persistent fever, following pneumonia. Holt describes a most interesting case of this nature in which there was for over four weeks a temperature range from 100° to 105° F. Autopsy showed a small collection of pus between the diaphragm and the lung.

Periodic Fever.—Not infrequently we see cases which show some of the clinical signs of malaria as regards periodicity in the temperature, but without splenic enlargement, or the presence of the malarial organism in the blood. Yet, often, these cases quickly respond to full doses of the bisulphate of quinin.

Typhoid Fever.—Occasionally a case with low persistent temperature elevation, obscure for a week or two, proves to be a mild typhoid.

Tuberculosis.—An elevation of the temperature is sometimes the first premonitory symptom of tuberculosis. Tuberculosis in a child, however, is usually an active process when it involves the lungs, and can readily be made out. When other parts are involved, such as the bones, glands, skin, or peritoneum, the manifestations are usually sufficiently plain to indicate the condition.

Intestinal Infection.—Intestinal infection of a latent type may be the cause of persistent fever. In a suspected case in the absence of bowel symptoms, it is well to give a laxative and put the child temporarily on a reduced diet consisting largely of carbohydrates.

Unexplained Elevations of Temperature.—I have known children to run an unexplained temperature of from 100° to 101.5° F. for weeks, without any other sign of illness. I have had these cases examined by eminent consultants and I have seen them recover without a diagnosis. Of one thing, however, we may rest assured: If a competent, thorough examination of the patient does not reveal the cause of the temperature, we are safe in concluding that there is nothing of a very serious nature back of it.

Illustrative Case.—The history of a case of this kind, which gave me no end of trouble and annoyance, may not be without interest.

The patient, an eight-year-old boy, was the only son of a habitually anxious mother, who had unfortunately learned to use the clinical thermometer. She took her boy's temperature after school one day early in December. She found that the thermometer registered 100.5° F. I was consulted, saw the boy in the evening, took his temperature, by mouth, with my own thermometer, and found it 100.8° F., with no other evidence of disease. He was perfectly normal in every other respect. He maintained that he felt well, did not need a doctor, and wished to be let alone to study his lessons. The following morning the temperature was 100° F.; in the evening it was nearly 101° F. For six weeks this temperature range continued, never below 100° F., never higher than 101.2° F. The boy, against my advice, was taken from school. He was put to bed, and a half-dozen consultants saw him without shedding any light on the case. Finally the mother became reconciled to "doing nothing" for her son, and he was taken to a nearby winter resort. I suggested to the father that before leaving town he should "accidentally" drop the thermometer on the hardwood floor and then refuse to have another in the house. This he managed to do, straightway. The boy had an excellent time at the winter resort, played with his sled in the snow, skated on the lake, fell through the ice once and received a thorough wetting, without harm. In three weeks he returned, improved as much as any city child improves from a country outing. His temperature was not taken during these three weeks at the winter resort and has not been taken since, except where there were evidences of illness. He is now developing along normal lines and is a fair physical specimen for his age.

COLD SPONGING IN FEVER

Sponging with plain water, with salt water (a teaspoonful of salt to a pint of water), or with alcohol and water (one-fourth alcohol to three-fourths water) is a means of reducing high temperature with which every physician should be familiar. Cool sponging, 75° F. to 80° F., plain or medicated, is useful for two purposes: as a sedative and for the reduction of fever. In measles or scarlet fever, although the temperature may not be high, the itching and

burning of the skin prevent sleep, and the patient is very uncomfortable, but often, under such conditions, he will fall asleep during a careful sponging. In pneumonia, in typhoid fever, and in the intestinal disorders of summer, my nurses have a standing order to give a cold sponging for fifteen minutes at any time when, in their judgment, it may be indicated, not on account of the fever but because of its sedative effect upon the patient. A sponging of from ten to fifteen minutes three or four times a day with cool water, 65° to 75° F., will greatly help a baby, whether sick or well, to pass successfully through the hot days of summer.

Sponging for fever, while possessing less antipyretic value than do other measures, such as a cold pack, for example, has the advantage in that it is safe and easy of application in the hands of the most unskilled, and will be of assistance in controlling high temperature when other means are not available. In order not to antagonize or frighten timid children, it is often wise to begin with the water, whether plain or medicated, at 95° F. and reduce the temperature gradually by the addition of cold water or small pieces of ice. It is rarely necessary to go below 60° F., and usually the sponging should not be continued longer than thirty minutes. It is well to have an interval of rest—from thirty to ninety minutes—between the spongings, as too frequent sponging, if resisted, may exhaust the patient. Every part of the body should be sponged in turn, but it is not necessary to expose the patient, who should be covered with a flannel blanket. When the process is completed the skin should be briskly rubbed for a few minutes with a dry, rough towel.

THE COOL PACK

The cool pack properly applied is without the slightest danger to the patient and is the best means we possess with which to combat a continued high fever. It may be used as freely and with as much success in the exanthemata as in typhoid fever or pneumonia. That cool water may not safely be applied to the skin of a child with scarlet fever or measles is a fallacy which it is our duty to explain to mothers.

The pack is prepared as follows, a rubber sheet being used to protect the bed-sheet: A large bath towel or some thick, soft, absorbent material should be used; muslin, linen, or any thin material does not answer as well. Slits are cut in the towel large enough for the arms to pass through and the towel is folded around the body, enveloping only the trunk and buttocks (Fig. 61). The pack should not extend below the middle of the thighs. This leaves the arms and the greater part of the lower extremities free. A hot-water bag, carefully guarded, should be placed at the feet and the patient covered with a blanket of medium weight. The towel is moistened with water at 95° F. This higher temperature is necessary at first

in order not to frighten the patient, as sudden cold is apt to do, and also to avoid shock. In two or three minutes the towel, without being removed, is again moistened with water at 90° F., later with water at 85° F., and still later at 80° F. When the temperature of the water reaches 80° F., it is better to hold it at this point for half an hour, when the patient's temperature should again be taken. If at the beginning his temperature was 105° F. and now shows but slight or no reduction, the temperature of the water with which the towel is moistened should be reduced to 70° F., or if necessary, even to 60° F. The child throughout need not be disturbed, except to turn him from side to side to wet the towel with water of the desired temperature, this being one of the advantages of the pack over a tub-bath or sponging.

For the first hour or two in a pack the temperature of the patient should be taken every half hour. When it is reduced to 102° F., the pack should be removed, for, if it is continued longer, too

Fig. 61.—The Cool Pack.

great a reduction may take place. If it rises again rapidly to 105° F. or higher, it is well to keep the patient in the pack continuously. The degree of cold necessary, in the individual case, to keep the temperature within safe limits will soon be learned. I recently kept in a pack for seventy-two hours a boy four years old, with a lobar pneumonia. In this case a continuous pack of 70° F. was required to keep the temperature at 104° F. or slightly lower. The towel, or other material employed, should not be used for more than six hours, when it should be changed for a fresh one.

Another reason for frequently taking the temperature is that early in the attack we do not know how it will be affected by the continued cool applications. In some children it is very readily influenced, and in such a case collapse might follow a very sudden reduction of the temperature. In cases readily controlled, the pack may be necessary for only one-half hour or an hour, at intervals of three or four hours. An ice-bag may with advantage be kept

at the head when the child is in the pack. Suddenly enveloping the entire skin surface in a cold sheet at 70° F., as advocated by some writers, may increase the temperature and produce grave symptoms of impending death because of the sudden contraction of the superficial blood-vessels, which sends the blood to the viscera, producing congestion of the internal organs.

BATHING THE SICK

There is a pronounced objection among many to bathing children when ill, particularly when they are suffering from respiratory diseases or from the exanthemata. The functions of the skin as an organ of excretion and elimination are most important, and it is absolutely necessary that, during illness, when oftentimes the metabolic processes of the body are being carried on to an excessive degree, all the eliminating organs be kept in the best possible condition in order that they may the better do their work. Therefore to have the skin perform its functions properly it must receive proper attention, and there is no better means for stimulating it to a sharp reaction than bathing with weak salt water —a teaspoonful of salt to a gallon of water—at a temperature of 85° to 90° F., followed by a brisk rubbing. Every sick child should receive a sponge bath at least once daily. It is the sudden contact of cold air with the moist skin, which occurs sometimes in undressing a child, without the attendant reaction, that causes the shock, the "cold," which is usually attributed to the bath. It is the temperature of the room in which the child is undressed, the careless method of bathing, and not the application of water which cause the trouble. Even the danger of this exposure is greatly overestimated. In order to avoid every possible danger, however, the temperature of the room in which the sick or delicate child is bathed should be raised to 80° F. I have yet to know of a child who suffered from the effects of a bath properly given, and I know of hundreds who have suffered because of the absence of it.

VACCINATION

Every infant in fair health should be vaccinated. The vaccination should be done as soon as the child is thriving on a rational diet. The younger the child at the time of vaccination, the less the constitutional disturbance. In well infants, vaccination should never be delayed beyond the fifth month.

The Site.—The site selected for the vaccination is usually on the left arm in boys, at about the point of insertion of the deltoid, and in girls on the outer aspect of the calf of the leg. I have found, however, that it is a matter of much more convenience to the mother in dressing and handling the child, if the leg is selected in both sexes. The dressing is more easily applied to the wound and can the more readily be kept in place on the leg. Further, in the manipulation necessary in dressing and undressing, much less discomfort is occasioned when the sore is on the leg.

The Method.—Before scarification of the skin, the site selected should be well scrubbed with common soap and water, dried, and then washed with alcohol. The area of scarification should not be over one-quarter of an inch in diameter, and should be sufficient to produce only a light flow of serum. A deep scarification, producing a free flow of blood, is very apt to be unsuccessful. The best scarifier is an ordinary sewing-needle, which should be sterilized by placing the point for a few seconds in an alcohol flame. The virus which is furnished in hermetically sealed capillary glass tubes is the safest to use. The drop of virus is deposited on the abraded surface and rubbed well into the wound, using the side of the needle for this purpose. When the wound is thoroughly dried, a protective dressing should be applied. The safest and most convenient is a sterile gauze bandage, which is wrapped several times around the arm or leg and secured with a safety-pin. On account of the shape and position of the parts, the bandage is very apt to become displaced, downward. In order to prevent this, a strip of adhesive plaster one inch wide and five or six inches long is placed over the bandage at right angles to it. The middle portion of the plaster readily adheres to the bandage and the two ends, at least two inches long, are anchored to the skin.

The After-treatment.—The mother is instructed to report in seven days after the vaccination. On the seventh day the dressing is removed, and if the vaccination is successful, the characteristic pearl-like vesicle will be present. If, on account of accident or rubbing of the parts by the patient, the vesicle is broken, the non-adhering

gauze should be carefully cut away around the sore, allowing that which adheres to remain. Under no conditions should the wound be opened. A gauze dressing is again applied and kept in position by adhesive strips. At the end of the exudative stage, usually about five or six days, the dressing should again be changed, either by the mother or the physician, and continued until the crust falls, which will be from the third to the fourth week after the vaccination.

If there is no sign of the vesicle in ten or twelve days, the vaccination, if primary, should be repeated. Re-vaccination should be practised at least once in five years and at more frequent intervals during epidemics of smallpox.

Complications. — If vaccination is properly performed, the dangers attending it are practically *nil*. That death and serious results have followed vaccination is no argument against its use, but is a grave reflection on the manner in which, as a rule, it is performed. The scarification of bacteria-laden skin, producing at the outset an open wound which is indifferently or not at all protected from further infection, is very apt to produce complications of a troublesome and often serious nature. Erysipelas, extensive cellulitis, and sloughing of the parts as the result of careless vaccination are not infrequently seen at out-patient departments for children. I have seen in two cases a reinoculation, as the result of scratching the sore, thus transferring the virus in one case to the upper lip and in the other to the left upper eyelid, these places being the site of the vaccination sore.

Vaccination Shield.—There is not a vaccination shield on the market with which I am familiar that is safe for use. Some cause a maceration of the wound, others allow a free entrance of bacteria, while still others prevent a free superficial circulation of the blood and increase the chance of ulceration. Moreover, the shields are very apt to become displaced, causing a rupture of the vesicle, with resulting infection.

Constitutional Disturbance.—A certain degree of constitutional disturbance is present in every child in which the vaccination is successful. After the first month, however, the younger the child, the less the constitutional disturbance. Children vaccinated during the second or third month suffer practically no inconvenience. There is a rise in temperature, from 100° to 101° F., for a day or two, and when the process is at its height, perhaps a slight degree of restlessness. Time and again I have seen children, vaccinated at this age, pass through the various stages without manifesting the slightest discomfort. In older children the severity of the constitutional symptoms appears to increase with the age. Thus, a child in the second or third year may have fever, 102° to 104° F., loss of appetite, coated tongue, and moderate prostration. Very active symptoms rarely last longer than three days unless there is a considerable accompanying cellulitis.

Local Applications.—Active treatment, other than relieving the immediate constitutional symptoms, is rarely required. Even when there is an active cellulitis I have found it advisable not to attempt local applications, such as lotions or compresses. All ointments have a tendency to dissolve and loosen the crust, producing an open wound. When, on account of suppuration, the crust falls, leaving a deep ulcer formed by granulation tissue, active local treatment will be required. Such ulcers are often seen in out-patient work. A wet dressing of a saturated solution of boric acid has answered well in these cases. If the wet dressing cannot be kept properly applied, a 10 percent ointment of boric acid may be applied twice a day and will be found of considerable service in hastening the closure of the wound. The ointment should be smeared freely on gauze or clean linen and held in position by a properly applied bandage. In young children the ulcers are often most obstinate. In a few instances I have known them to continue from eight to ten weeks. In a case in which the healing is particularly slow, the familiar dressing of balsam of Peru (5 percent) in castor oil, applied twice daily on a pad of several thicknesses of gauze and covered with oiled silk, has appeared to hasten the granulation. Unhealthy granulations may have to be curetted before the dressing is applied.

INSTRUCTIONS FOR THE SUMMER

In addition to advising parents as to a selection of a summer resort for the family, I advise the mother as to the particular care of the child during the summer whether he is to remain in town or go to the country. During the months preceding the heated term every mother whose infant is under my care, whether in dispensary or private, is made aware of the dangers of the next few months, and means are suggested and written directions are given as to how to pass through the summer with the greatest security. She is told what market milks are the best. She is told that the milk must be kept on ice, with ice surrounding the bottle, from the time of its delivery until it is given to the child, except, of course, the time spent in its special preparation.

During the hot months in New York city the child's digestive capacity is not equal to that of the colder months. Children who remain in the city are given weaker milk mixtures by a reduction of from 15 to 25 percent in the fat and proteid, the sugar remaining the same. True, the infant may not gain very much in weight, but on a reduced diet he is much more apt to pass through the summer without intestinal disorders, and there is an abundant opportunity for him to gain later on. Mothers are instructed as to the amount of clothing required. They are told that a napkin, a muslin slip, a loose-mesh knitted band, are all that are required, on very hot days. They are instructed to give the infant frequent drinks of boiled water between his feedings, and if he suffers much from the heat, as shown by prickly heat and restlessness, to give him two or three spongings daily with a cool solution of bicarbonate of soda, one teaspoonful to a pint of water.

It is made very plain to them that vomiting or a green undigested stool is a danger-signal which always means that the milk must be withheld for twenty-four hours or longer whether the child is nursed or bottle-fed, and that either barley-water or one of the other carbohydrate gruels (page 125) must be substituted until such time as the stools improve or the vomiting ceases. This is one of the most important life-saving measures the physician can teach the mother. An immense majority of the intestinal diseases of summer which destroy thousands of lives yearly, have their origin in a neglected acute indigestion and diarrhea, which if properly managed means a slight illness of but a day or two. Therefore it is further impressed upon the mothers that upon resuming the milk diet, it must be given at first greatly reduced in strength and then gradually increased

until food of the previous strength is given. Beginning with one-half ounce of skimmed milk in each feeding, by watching its effects upon the temperature and the stools, an increase of perhaps one-half ounce may be made each day.

I have experienced not a little trouble in the past in securing safe milk for infants who were removed at a considerable distance from the depots of the better class of dairies that supply certified milk. The average farmer is notoriously careless in the handling of milk, and in the country districts, where the milk-supply should be the best, it is often as bad as can well be imagined. In remote country districts where the milk is furnished by the farmer a special arrangement is made, by which he agrees that the cow's belly, udders, and teats shall be wiped off with a damp cloth before milking; that the milker's hands shall be washed before milking; that the few jets of the fore-milk shall be thrown away; and that as soon as the milk is drawn it shall be strained through absorbent cotton into a quart milk bottle, suitably corked, and placed in a pail of cracked ice. A mother of one of my patients is using her silver champagne-cooler for this purpose at the present time! The cracked ice and the absorbent cotton are, of course, furnished by the consumer. For the extra trouble the farmer receives from twelve to twenty cents a quart for the milk. At one resort three babies were supplied in this way by one small producer, with a comparatively safe milk. The improved milk-pail (Figs. 10, 11) insures a much cleaner milk, as it offers much less opportunity for droppings to fall into it during the milking.

For those who have country homes and who can control their milk-supply the above precautions may be carried out to the letter. By such careful control of the home product, and by the use of milk from those dairies only which observe the above precautions, the acute digestive disorders of summer among my patients are rendered a very unusual occurrence. These precautions, with the knowledge of the mother or nurse as to what to do at the first sign of a digestive disorder, will reduce the number of the so-called summer diarrhea cases to a very insignificant figure.

Among out-patients in large cities who have to use other milk and milk less clean, summer diarrhea must prevail. Among these, however, the death-rate may be remarkably reduced through the education of the mothers. At the out-patient department at the Babies' Hospital there is a very low death-rate from summer diarrhea. At this dispensary there is a clientèle of fairly intelligent mothers who have been coming to us for years. By pamphlets of instructions as given below, and by showing these mothers that we have a personal interest in their children, we gain their confidence. They believe what we tell them, and, as a result, we repeatedly have children brought to us well along the road to recovery.

For example, a child had developed diarrhea; he had been given a dose of castor oil, his milk was stopped and barley-water or rice-water given. The mothers are further told that it is never a good thing for a baby to have diarrhea; that a diarrhea is never without dangers; and that an infant who has frequent attacks of indigestion during the cooler months is very sure to develop diarrhea during the hot months; and that the safest means of keeping a baby well in the summer is to keep him well all the year round.

Rules for the
CARE OF DISPENSARY INFANTS AND YOUNG CHILDREN
During the Summer.

1. *Clothing:* During the very hot days the baby should wear a napkin, a thin gauze shirt, and a thin muslin slip; an abdominal binder made of thin material, and loosely applied, may be worn until the child is six months of age. After this age the binder is not necessary.

2. *Bathing:* Every child should have one tub-bath daily. On very warm days from two to four ten-minute spongings with cool soda water (one teaspoonful of bicarbonate of soda to a pint of water) will greatly add to the child's comfort.

3. *Fresh Air:* Fresh air is of vital importance. Leave the windows open. Keep the child in the open air when possible. Avoid the sun. Select the shady side of the street and the shade in the parks.

4. *Sleep:* Sleep is very necessary for growing children. A noonday nap of at least two hours should be insisted upon until the child is four years of age.

5. *Soiled Napkins:* Soiled napkins should be placed in some covered receptacle containing water, and washed at the earliest opportunity.

6. *Drinking-water:* Boil one quart of water every morning. Put it into a clean bottle. Keep the bottle in a cool place. Give the water between the feedings, as much as the child will take.

7. *Breast-feeding:* The mother should wash the nipple with plain cold water before each nursing. She should be very careful as to diet and the habits of life. The bowels should move once a day. Constipation in the mother produces illness in the child. There should be three plain, well-cooked meals daily, consisting largely of milk, meat, vegetables, and cereals. Beer and tea are often harmful. A large quantity, a couple of pints or more daily of either, is positively dangerous.

From birth to the third month: The baby should be nursed at two and one-quarter hour intervals during the day. Nine nursings in

twenty-four hours, with only one nursing between 10.30 P. M. and 6 A. M.

Third to sixth month: The nursings should be at three-hour intervals during the day; seven to eight nursings in twenty-four hours, with one night nursing.

Sixth to ninth month: The child now takes a larger quantity at each feeding and the night nursing is not necessary. He should be nursed at three to three and one-half hour intervals; six nursings in twenty-four hours.

Ninth to twelfth month: The nursings should be at three and one-half to four-hour intervals, five nursings in twenty-four hours.

8. *Bottle-feeding:* The bottle should be thoroughly cleansed with borax and hot water (one teaspoonful of borax to a pint of water) and boiled before using. The nipple should be turned inside out, scrubbed with a brush, using hot borax water. The brush should be used for no other purpose. There should be three or four sets of bottles and nipples. The bottles and nipples should rest in plain boiled water until wanted. Never use grocery milk. Use only bottled milk which is delivered every morning. The milk should be boiled for five minutes immediately after receiving. The feeding hours are the same as in breast-feeding. Children of the same age vary greatly as to the strength and amount of food required. A mixture, when prepared, should be poured into a covered glass fruit-jar and kept on the ice. For the average baby the following mixtures will be found useful:

For a child under three months of age: Nine ounces of milk, twenty-seven ounces of boiled water, four teaspoonfuls of granulated sugar. Feed from two to four ounces at two and one-quarter-hour intervals—nine feedings in twenty-four hours.

Third to sixth month: Eighteen ounces of milk, thirty ounces of barley-water, six teaspoonfuls of sugar. Feed four to six ounces at three-hour intervals—seven feedings in twenty-four hours.

The barley-water is prepared by boiling a tablespoonful of Robinson's barley flour or Cereo Co.'s barley flour in one pint of water for twenty minutes; strain and add water to make one pint.

Sixth to ninth month: Twenty-four ounces of milk, twenty-four ounces of barley-water, six teaspoonfuls of granulated sugar. Feed six to eight ounces at three-hour intervals—six feedings in twenty-four hours.

Ninth to twelfth month: Thirty-eight ounces of milk, twelve ounces of barley-water, six teaspoonfuls of granulated sugar. Feed seven to nine ounces at three and one-half hour intervals—five feedings in twenty-four hours.

9. *Condensed Milk:* When the mother cannot afford to buy bottled milk, when she has no ice-chest or cannot afford to buy ice, she should not attempt cow's-milk feeding, but canned condensed milk

may be used as a substitute during the hot months only. The can, when opened, should be kept in the coolest place in the apartment, carefully wrapped in clean white paper. The feeding hours are the same as for fresh cow's milk.

Under three months of age: One-half to one teaspoonful condensed milk; barley-water No. 1 (see formulary, page 129), two to four ounces.

Third to sixth month: Condensed milk, one to two teaspoonfuls; barley-water, four to six ounces.

Sixth to ninth month: Condensed milk, two to three teaspoonfuls; barley-water, six to eight ounces.

Ninth to twelfth month: Condensed milk, three teaspoonfuls; barley-water, eight to nine ounces.

10. *Feeding after one year of age:* All children should be weaned at the age of twelve months unless otherwise ordered by a physician. The bottle-fed, also, at this age require more than milk and cereal water. During the second year children are almost invariably badly fed.

Four meals a day should be given at the same hours every day. The mother will select suitable meals from the following articles: soft-boiled egg; scraped rare beef; strained broth of beef, mutton, or chicken with stale bread broken into it; toast and butter; stale bread and butter; toast and milk; stale bread and milk; oatmeal (cooked three hours) and milk; hominy (cooked three hours) and milk; cornmeal (cooked two hours) and milk; farina (cooked one hour) and milk. The milk used must be boiled, during the hot weather.

11. *Summer Diarrhea:* When the baby has loose green passages it means that he is sick and needs medical attention. The disease is frequently mild at the beginning. There may be no fever and the child may show no signs of illness other than the diarrhea. Such a baby oftentimes, with milk-feeding continued, becomes dangerously, if not fatally, ill in a very few hours. The simplest cases of vomiting and diarrhea during the summer must never be neglected. A baby sick in this way should be given two teaspoonfuls of castor oil. Stop the milk at once. Give only barley-water or rice-water until the child can be taken to the family physician or to a dispensary. With slight variations the above rules may be made to apply to many outside of the dispensary class.

SUMMER RESORTS

Where to take a baby for the hot months of the year is a vexed question which is raised in many city households every year, and it is one concerning which the physician is frequently called upon for advice. Several years of observation of a great many New York

City children who have spent the summer out of town have led me to the following conclusions:

First, the most desirable summer outing is the first half of the season at the seashore, the remainder inland, preferably in the mountains.

Second, the next place in order of desirability is inland, preferably the mountains, for the entire summer.

Third, the least desirable is the seashore for the entire summer.

It is not to be understood that many children will not do well if kept at the seashore throughout the hot months. Some, indeed, improve most satisfactorily, but among my own patients I have repeatedly been impressed with the disadvantages of a too prolonged stay at the seashore. If kept there during August, infants are apt to show signs of lassitude, and while not ill, they do not return to the city in the autumn with the vigor, appetite, and general robustness which characterize those from the hills and mountains. It must be remembered that only New York city children are referred to. Children whose home is a seaport thrive best when given the benefit of a complete change to the dry, invigorating air inland. Children with catarrhal tendencies, bronchitis, adenoids, before or following operation, and children who have had attacks of rheumatism or who show rheumatic tendencies, should not go to the seashore, wherever their residence. In referring to an inland resort, the mountains, by which we understand an elevation of from 1500 to 2000 feet, are not always necessary. The place selected, however, should be at an elevation of at least 600 feet. For cases of chronic bronchitis and rheumatism, a soil of sand or gravel is best, and the sleeping-room of the child should always be above the ground floor.

Other points to be considered in connection with the summer outing are the kitchen facilities, which must be ample. Often the larger hotels refuse the right of way to the kitchen. I find that in this respect much more liberty is given in the smaller hotels and boarding-houses. The proper preparation of the child's food in the cramped quarters of sleeping-rooms is not impossible, but it is often difficult and always objectionable; therefore if a cottage is available, it will be greatly to the child's advantage. Before selecting a home for the summer, the drainage and the source and quality of its milk-supply should receive the most careful attention. Country well-water or spring-water should invariably be boiled before using.

THERAPEUTIC MEASURES

COUNTER-IRRITANTS

The counter-irritants which I have found especially useful in pediatrics are mustard, capsicum, turpentine, camphor, chloroform, and iodin.

Counter-irritants are useful in children for two purposes—for the relief of pain and for the effect upon internal inflammation and congestion. Without doubt the diseased conditions in which counter-irritation is of most value are in the acute affections of the respiratory tract, such as bronchitis, bronchopneumonia, and pleurisy. In acute bronchitis, when the terminal bronchi are involved, when there is cyanosis and rapid respiration—from sixty to eighty per minute—enveloping the thorax in a mustard plaster, one part mustard to two of flour (see page 272), and keeping it in position until the skin is well reddened, will often reduce the respirations from twenty to thirty per minute, and the child, previously tossing and restless, will fall asleep. I have repeatedly been asked by nurses and mothers if the counter-irritation could not be applied more frequently because of the apparent relief experienced by the patient. The applications may often be made with advantage at intervals of from four to six hours. They should be sufficiently strong to produce the desired redness of the skin in from five to ten minutes. This will usually be produced by using one part of mustard to two of flour, when the applications are first used. When the skin becomes tender from the repeated applications, but one part of mustard to five or six of the flour may be required. If the plaster is made too weak, it must remain long in contact with the skin, which thereby becomes macerated.

Indications.—*In Acute Inflammations of the Respiratory Tract.*—When the bronchitis is of the asthmatic type, when there is decided bronchial spasm associated with bronchial catarrh, the counter-irritation furnishes not a little relief. In this condition the whole thorax should be enveloped. In bronchopneumonia with considerable bronchitis, local applications of mustard over the involved areas are to be advised. The pain from pleuritic inflammation occurring independently of or at the onset of lobar pneumonia, or when it develops during bronchopneumonia, may be considerably relieved by counter-irritation. Here also the mustard should be used only over the painful area. When the pain is severe, equal parts of mustard and flour may be used for the first application, if carefully

watched, for a quick, sharp skin reaction should be produced. If there is any further action than that of a sedative through retarding the inflammatory process within, we have no means of proving it. The mother or nurse should always be cautioned to watch the skin under a counter-irritant so that a blister shall not be produced.

During the stage of engorgement and congestion of the bronchi, indicated by roughened or sonorous breathing with occasional sibilant râles, a brisk counter-irritation with mustard, or with camphorated oil and turpentine, appears to hasten the progress of the case toward recovery. That a respiratory disease is ever aborted by these methods, as claimed by some, is exceedingly doubtful. If the turpentine is used with the camphorated oil, the proportion should be one part of turpentine to two parts of the camphorated oil. The mixture should be well shaken before use and applied with the hand vigorously for ten minutes or until a distinct redness of the skin is produced. The mustard or the turpentine should be used in these cases at least three times a day. I know of no condition where it is necessary to blister a child's skin. Capsicum vaselin may be used in the same way and for the same purpose as the camphorated oil and turpentine.

In Colic.—In severe colic a turpentine stupe will often furnish prompt relief, twenty drops of turpentine being mixed with one pint of water at 106° F. Into this a piece of flannel is dipped and wrung sufficiently dry not to moisten the bed-clothing and placed over the abdomen. Over this is placed a dry flannel and oiled silk so as to retain the heat and moisture. The application may be renewed every fifteen or twenty minutes if necessary.

In Pleurisy and Empyema.—When adhesions exist in empyema and pleurisy, while the pain is not acute, there is an uncomfortable drawing, dragging sensation in the chest which may persist for months. This has been relieved in a few of my cases by the tincture of iodin, U. S. P., painted over the painful parts every third or fourth night.

In Intercostal Neuralgia.—In intercostal neuralgia, not infrequently seen in overworked school-girls, the repeated application at intervals of three or four days of tincture of iodin over the point of exit of the involved nerve, will often be followed by complete cessation of the pain.

Acute Articular Rheumatism.—For the pain in acute articular rheumatism, chloroform liniment, U. S. P., may be applied to the joint.

ANESTHETICS

That the use of anesthetics in children is attended with considerable danger is proved by the statistics relating to the subject. That the greatest care and judgment should be exercised in the selection of an anesthetic for a child is readily understood. As a routine anesthetic for the young, ether is preferable because of its safety. The

popular belief that chloroform is without danger is an error and not sustained by statistics. There are conditions, however, when ether is contraindicated. In cases in which there is bronchial involvement, ether increases the bronchial secretions and produces a free flow of saliva, which is liable to be aspirated into the lungs. In case of any obstruction to respiration, as in laryngeal diphtheria, retropharyngeal abscess, and enlarged glands which may encroach upon the air-passages, chloroform and not ether should be employed. Ether is further contraindicated in scarlet fever or in nephritis. In such cases chloroform is to be selected. Chloroform is to be used also for the sake of convenience, if other conditions allow, in operations about the mouth and the nose. Chloroform is contraindicated in general weakness, exhaustion, collapse, and in anemia. Ether given by the drop method should be used in those cases. Statistics of chloroform anesthesia show a considerable mortality in operations for adenoids and enlarged tonsils. The interference with respiration and the sudden hemorrhage make chloroform dangerous in these operations. In heart disease with imperfect compensation, any anesthetic is dangerous, but ether by the drop method is the least so. Nitrous oxid gas, which of late has become very popular, should be used with caution in children under two years of age. Young children are very easily asphyxiated by gas; the younger the child, the greater the danger. Under two years of age, sudden and alarming asphyxia has resulted from its use. It should be used, therefore, very sparingly and the patient watched most carefully for signs of cyanosis. The use of gas in children usually precedes the administration of ether, as it renders the use of the latter much easier for the patient. It is contraindicated, however, in any condition where dyspnea is present; in fact, in any illness in which respiration is impeded, gas is dangerous. The combination of gas and ether in such cases is not as safe as chloroform, which is to be given in a minimum amount with oxygen as a safeguard.

Danger-signals During Gas Administration:

Cyanosis; jerking respirations; dilated pupils; convulsive movements of any portion of the body.

Danger-signals with Chloroform:

Pallor; ashen color; feeble, shallow respirations, gasping in character; dilated pupils and separation of the eyelids; slow, feeble heart action.

Danger-signals with Ether:

Marked cyanosis; stertorous breathing; rapid pulse; dilated pupils; short, quick, gasping respiration.

The use of ethyl chlorid is in the experimental stage. Statistics show quite a mortality from its use. In case the condition of the patient shows any of the danger-signals, it should temporarily or permanently be discontinued and some other form of anesthetic substituted.

COLON FLUSHING

In colon flushings a normal salt solution should invariably be used. It is given with the idea of having it retained and absorbed for the purpose of furnishing needed fluid to the body. It may be of service in any case in which but little fluid is taken by the mouth. It has been particularly serviceable in severe cases of scarlet fever, diphtheria, pneumonia, and cyclic vomiting, when little fluid was taken, or if taken, was not retained. The large amount of fluid which the colon will absorb when the organism demands it is surprising.

In a case of cyclic vomiting, a boy, who had retained absolutely nothing given by mouth for three days, retained one pint at the first colon flushing, one-half pint more after six hours, and a second half-pint six hours later. The flushings were begun on the third day of the attack. Although the prostration was extreme, the prompt improvement in the general condition of this patient was most gratifying. After the first injection the pulse improved, the apathy disappeared, the child began to ask questions and showed interest in his surroundings.

Severe toxic cases of diphtheria and scarlet fever, where but little fluid is taken and where the toxicity of the blood is extreme, as shown by the stupor and delirium, are often much improved by the free use of colon flushing, which supplies the water which the child needs but which cannot be given by mouth, or if given may not be retained.

A boy nine years of age, ill with scarlet fever, who could take very little fluid, was able to retain eight ounces of a salt solution given at eight-hour intervals for three days.

A child six months of age had retained absolutely nothing on the stomach for six days, because of intussusception. When I saw him on the sixth day, the respiration was superficial and slow. He was cold and practically pulseless. The second heart-sound could be heard but faintly with the stethoscope. The intussusception, greatly to my surprise, was reduced by water-pressure (page 223). Hot salt-water flushings were at once begun; the patient retained ten ounces, given at a temperature of 110° F., and in a few minutes there was a very perceptible improvement. With repeated flushings at six-hour intervals the child continued to improve, and made a perfect recovery.

I usually order the salt solution given in quantities of from one-half pint to a pint, depending upon the age of the child, at intervals of from six to eight hours, but never at a lower temperature than 100° F.

The apparatus required is a small rectal tube attached to a fountain syringe. The flushing is best given with the patient resting on

his left side with the buttocks elevated on a pillow, the tube, well oiled, being introduced at least nine inches into the bowel. The solution is allowed to pass into the bowel, when the tube is quickly withdrawn. To assist in the retention of the fluid, the patient should remain on his side for one-half hour.

ALCOHOL

In its relation to children, alcohol, regardless of the form in which it is used, must always be considered as a drug and not as a beverage. It is occasionally of great service in diseases of children. Under certain conditions it answers better than any other means of stimulation we possess. The fact that it is grossly misused does not in any way detract from its value in illness. It is too often given, chiefly for the reason that its use, in the form of whisky and brandy and wine, is advocated in medical works in many of the ordinary ailments of childhood where really it is absolutely contraindicated. Its use, in my hands, has been that of a food and stimulant in very grave conditions, the duration of its usefulness being often completed in a day or two. When given to children for a prolonged period even in moderate quantities, it invariably interferes with digestion and assimilation, and therefore does harm. It is very liable also to act as an additional irritant to the kidneys, which are prone to show inflammatory changes as a result of the systemic toxemia, due to the disease. We have heart stimulants which are ordinarily as effective as alcohol and without its danger either to the stomach or the kidneys.

It is my practice never to give alcohol early in an illness, unless the onset is accompanied by profound prostration, but rather to hold it in reserve until absolutely necessary. Used in this way, it has been of much service in two conditions in which, in my opinion, nothing can replace it. I refer, first, to that time which may arise in any grave disease when the heart fails to respond to the usual stimulation, as in the crisis of lobar pneumonia, and in the profound toxemia of scarlet fever or diphtheria. At these times the powers of assimilation for most drugs as well as for food are reduced to a minimum. When food is rejected or taken badly, when the usefulness of strychnin, strophanthus, musk, camphor, and digitalis has been exhausted, then give alcohol, and give it in as large doses as may be required to produce the desired results. It is astonishing what large quantities of alcohol may be given without the slightest intoxicating effects in many such conditions. When given well diluted it is usually well borne and assimilated, it supports the heart, improves the respiration and often will carry the patient through to a successful convalescence even when the outlook is very unpromising. As the system readily becomes accustomed to alcohol, it must be given in increasing doses. If it is begun early in the ill-

ness, it will have lost its stimulating effects by the time it is most needed. Brandy or whisky, well diluted, is the form in which it is generally used.

The second condition in which alcohol is useful is in cases with greatly lowered vitality resulting from some severe illness, such as typhoid fever, enterocolitis, or pneumonia. With a child suffering from shock bordering on collapse, or when in collapse with a subnormal temperature with all the vital powers at a low ebb, alcohol will do much to sustain him. In such cases whisky, well diluted—1 part whisky to 6 of water—given at intervals of two or three hours, will hasten recovery. If the child cannot swallow, the whisky may be given by gavage; if vomited, double the quantity, well diluted, may be given by the rectum. Its hypodermic use is infrequently resorted to chiefly for the reason that other remedies, such as strychnin and digitalis, are more effective than alcohol when so given. The doses vary from five drops to one-half dram every one or two hours, twelve to twenty-four doses in twenty-four hours, for a child one year of age. A child two years of age may be given one dram at intervals of one or two hours. Its use is attended with the least disturbance when it is given after the feedings.

HEAT AS A THERAPEUTIC AGENT

Heat has long been used as a therapeutic measure. In infants and children it has a wide range of usefulness, either as dry heat or by the use of water as a vehicle.

Moist Heat.—Heat, water-borne, is used as follows:

In colic and indigestion and as a diuretic, internally.

In acute gastritis, as a sedative, by sipping it.

In convulsions, idiopathic and uremic, by means of baths.

In convulsions, idiopathic and uremic, as colon flushings, 105° to 110° F.

In colic, as a hot stupe applied to the abdomen.

In torticollis, as a hot compress to the neck.

In sprains, as a hot compress to the joint or muscle.

In acute articular rheumatism, as a hot compress to the joint.

In retention of the urine, as a hot compress applied to the lower abdomen and bladder.

In suppression of the urine (*acute nephritis*), as a poultice or hot compress over the kidneys and in colon flushings, 105° to 110° F.

In cerebrospinal meningitis, as a hot bath or hot compress to the trunk and lower extremities.

In pleurisy, as a hot compress to the painful area.

In acute angina, as a gargle.

In conjunctivitis, as a hot compress.

To hasten suppuration in an abscess, as a poultice or compress.

In retropharyngeal abscess and in peritonsillitis (quinsy), as a throat douche.

In earache, as a douche or by means of a hot-water bag.

In toothache, by means of a hot-water bag, or as hot water held in the mouth.

In facial neuralgia, by means of a hot-water bag.

In prematurity, and in lowered vitality or reduced temperature after disease, by hot-water bags or bottles.

Dry Heat.—Dry heat is used in the following conditions:

In prematurity, lowered vitality, or reduced temperature after disease, by means of the electrotherm (page 46).

In suppression of the urine (acute nephritis), by the electrotherm, or by hot air (page 360).

In using heat with children caution should be exercised as to the degree employed. Serious burning accidents have occurred by the use of hot-water bottles and hot compresses. When it is used very hot, the hot-water bottle should be guarded by wrapping it in flannel. Moist heat in the form of compresses, poultices, and stupes should always be tested by placing the vehicles against the face of the attendant. The adult hand will bear a greater degree of heat than is safe, oftentimes, to apply to the skin of an infant or young child. In using hot packs, hot-water bags, the electrotherm, or dry heat, generated by a lamp or other device, such as the Kilmer kettle (page 360), a thermometer should be placed between the child's clothing and the bed-clothing. A temperature of 110° F. is the highest to use with children. When water is the vehicle it must be remembered that the patient must be most carefully watched and the application frequently renewed because of the rapid evaporation. A compress or poultice must not be allowed to get cool. A piece of flannel or oiled silk or rubber tissue over a hot compress will obviate the necessity for frequent changes.

COLD AS A THERAPEUTIC AGENT

In the treatment of children, cold is generally used in the form of compresses, baths, or packs, and is indicated in the following conditions:

In tonsillitis, acute pharyngitis, and headache, as a cold compress.

In meningitis and pyrexia by means of the ice-bag or the cool coil.

In appendicitis by means of the ice-bag.

In endocarditis and pericarditis by means of an ice-bag.

In fever by means of baths, cold packs, sponging, and in older children by colon flushings. (Not lower than 70° F. when used thus.)

In adenitis and in threatened superficial abscess by means of an ice-bag.

In hysterical and neurotic children as a spinal douche.

In malnutrition in older children as a tonic by means of a moderate cool spinal douche following a warm bath.

For further details as to the application of cold for special diseases the reader is referred to the discussion of the diseases in question.

THE THERAPEUTIC VALUE OF CLIMATE

That climate is a valuable therapeutic measure in the treatment of diseases in children is a well recognized fact. To my mind an important advantage of a change of climate is that it means more air and better air. When patients go to a resort for climatic purposes it is usually at no inconsiderable expense, and they are therefore pretty likely to avail themselves of its advantages. The same amount of air oftentimes could be furnished at home if the family coöperation always could be secured. By the use of the window-board, the roof-garden, and the indoor airing, we can to a considerable degree make a climate of our own. Nevertheless, in the majority of families the open-air treatment cannot be carried out successfully; therefore the best interests of the patients are secured when they are sent away from home. There are conditions also in which such means as those just mentioned do not apply even if they are carried out. We can give children warm air, and regulate the temperature of the air in the winter; but, if they live in any of our coast towns or villages, we cannot give them cool, dry air in summer. Children who can be removed from a large city to the country, inland, for the summer, are invariably benefited, not only as regards their food capacity and the ordinary influences of open-air life, but they acquire also greater powers of resistance, and are thus less liable to attacks from acute intestinal diseases. (See Summer Resorts, page 513).

During the colder months New York city children who are convalescing from pneumonia, pertussis, or any prolonged illness which has greatly reduced them, will make a much more rapid recovery when removed to Lakewood or Atlantic City, where open-air life is more easily secured than at home. Infants and children suffering from chronic digestive disorders, marasmus, and malnutrition, who are given the advantages of climate or open-air methods either in the home (page 153) or by a change of residence, invariably make a more rapid recovery than do those deprived of it because of a lack of appreciation of its value, or through fear of the child's taking cold.

Again, there are diseases in children in which the sudden change of temperature, affecting the peripheral circulation, may be decidedly harmful. Such conditions exist in slow convalescence from acute nephritis, and also in chronic nephritis. These cases require an equable climate, with a permissible outdoor life such as is furnished during our colder months by Florida and Lower California.

My experiences as to the effects of climate in asthma have been contradictory. As a rule, cold climates and high altitudes such as are offered by the Adirondacks, increase the asthma, particularly if emphysema is also present. Nevertheless, I have seen patients who were comfortable only when living under such climatic conditions. From November 1st to May 1st the best results have been effected in children by a change of residence from the cold and changeable weather of the Middle and Eastern States to Lower California or Florida. Residence at the seashore has not been helpful to my patients. Older children whose parents can afford it should be sent to a boarding-school, or to some other institution of learning located where the climate is such as to guarantee freedom from attacks.

The best winter climate for a child with pulmonary tuberculosis is a dry climate with a mild temperature, neither high nor low, but with sunshine in such abundance as to permit a daily outdoor life. Such a climate is found in southern New Mexico and Arizona. These places furnish conditions as near to the ideal as it is possible to approach. The Adirondacks, while furnishing a climate in winter which may be too severe for young children, answers well for those from eight to nine years of age in whom the disease is not far advanced.

The sanitarium treatment is always advised if the patient can afford it. Its advantages rest in the fact of the discipline, the diet, the amount of exercise, the sleeping quarters, the clothing—in short, in all the details of life, every one of which is important. In a sanitarium all these matters are in the hands of those who are skilled in the management of the disease, and who direct each case according to its individual needs. Resorts for tuberculosis cases are dangerous because of the possibilities of reinfection through the carelessness of others. In a well-managed sanitarium, however, regulations regarding expectoration and the care of the sputum reduce this danger to a minimum. Sanitariums, however, are available to but few patients. Many have not the means necessary to a change of residence, and many others refuse to allow their children to be separated from them, both of which facts necessitate the home treatment of a great majority of the cases of pulmonary tuberculosis in young children in our larger cities. (See page 300.)

PROMISCUOUS USE OF DRUGS BY THE FAMILY

While the giving of drugs to children by members of the family is not to be encouraged, I find it wise to furnish to most mothers a list of "permissibles." The love of people all the world over for drugs and their faith in their efficacy is so great that if they are not supplied by the physician, they are very apt to secure them elsewhere. If the reader has had an opportunity to look through the closets or chests of his patients, where medicines are kept, he perhaps has been

surprised at the number of preparations of proprietary and patent medicines which met his gaze. The solution of the so-called "nostrum evil" would be very simple if every physician would take the trouble to explain to his patients the character of—or, better, send them a copy of the official analyses of—the various proprietary drug preparations on the market. They should be convinced not only of their worthlessness, but also of the dangers attending their use. If mothers knew that most cough syrups and colic cures contain opium or some of its derivatives, they would not give them to their children. Neither would they themselves take the various tonics and restoratives, "discoveries," and "bitters" in the market if they knew that they contained a large percentage of alcohol. It is the duty of physicians to counteract, by teaching, the influence of the ingeniously constructed medical advertisements in the daily and weekly press, in both religious and lay periodicals. Not a little of what passes for knowledge of diseases and their so-called treatment is thus obtained by the layman through means that are intentionally misleading. It has long been my custom to give the mother prescriptions for coughs, for head colds, and for constipation. They are prepared and kept on hand for use in case they are required. At the same time the mother understands that I am to be called at once as soon as the child has fever. In defense of this practice, which may be open to criticism, I would state that I prefer to have my young patients take the remedies I prescribe, and which are harmless, rather than to have them run the risk of the administration of opium and alcohol, which would be very apt to be the case if this precaution were not taken.

UNPALATABLE AND NAUSEATING DRUGS

It is impossible to mention in detail all the drugs which might be included under this heading. Only those will be referred to which we are obliged to use almost daily in our work—drugs which are either unpleasant to the taste or which may be badly borne by the stomach or drugs combining both these elements. How to administer certain drugs so that their use may be continued and yet not interfere with the digestive function, is a question which deeply concerns those who may have children for their patients. The element of taste is a most important one in a child; therefore, when possible, drugs disagreeable to the taste should be given to children in tablet or pill form or in capsule. The continued use of a drug oftentimes depends upon its being made palatable. As a general rule, when pills, tablets, or capsules are given, one-half glass of water should be taken at the same time, in order to diminish any possible irritant effects upon the mucous membrane of the stomach.

Salicylate of Soda.—Salicylate of soda is a drug disagreeable in taste and very liable to destroy the appetite and interfere with digestion. In acute rheumatism its use is invaluable, and we are

obliged oftentimes to give it in large doses. It is best given after meals with one-half glass of milk. It is better to give fairly large doses at this time, well diluted, rather than more frequent smaller doses. It usually is better borne if given in solution with peppermint-water or with simple elixir diluted 50 percent with water; but the taste when thus given is only partially disguised, and being still very objectionable to many, it may be given in capsule if the patient is old enough, care being taken to give a considerable amount of water or milk with each capsule.

Iodid of Potash.—This drug is indispensable and is one for which no other can be substituted. It is best given in solution. It is most disagreeable in taste and a direct irritant to the mucous membrane of the stomach. Like salicylate of soda, it should be given after meals with from one-half to one glass of water or milk. It is best given plain, using the saturated solution, which may be dropped into the milk.

Bichlorid of Mercury.—This drug is usually given in such small doses that its irritant properties are but little felt. It is best prescribed in tablet form, dissolved in two teaspoonfuls of water and followed by a swallow of water. When possible, it should be given after feeding.

Alcohol.—Alcohol is another drug which should be given well diluted, regardless of the form in which it is administered. It is best given with or after food, but it should always be given diluted with at least six parts of water, if whisky or brandy is used.

Ipecac and Tartar Emetic.—Ipecac and tartar emetic, when employed as expectorants, are best given with sugar of milk in powder or tablet form. They should never be given on an empty stomach. Two or three teaspoonfuls of water should precede their administration when they are not given within a reasonable time after feeding. In many children, when given without this precaution even in the usual doses, they will often decrease the appetite and the digestive capacity.

The Ammonium Salts.—Carbonate of ammonia must always be given in solution and should always be well diluted with water. Muriate of ammonia may be used in tablet or powder form. Water or milk should precede the administration of either. One part of simple elixir with two parts of water make an agreeable combination.

Oils.—Oils used for nutritive purposes should invariably be given after meals. Plain cod-liver oil or any of the preparations containing it should never be given on an empty stomach.

Castor Oil.—Castor oil is best given when the stomach is empty. A much more prompt and satisfactory cathartic effect is produced when thus given. It may be given in soda-water or coffee, with orange-juice or in peppermint-water. Older children sometimes take it better plain, sandwiched between the two halves of a pep-

permint cream, first the candy, then the oil, followed by the remainder of the candy. If castor oil is vomited, it may be repeated in a few minutes, and often will then be retained.

Creosote.—Creosote is most difficult of administration to many children. I usually prescribe the carbonate, which is ordered to be dropped into one or two teaspoonfuls of wine after meals. It may also be given in soft capsules, or in an emulsion.

Quinin.—Quinin should be given in solution or in capsule. Quinin pills as they are sometimes made, with an insoluble coating, pass unchanged through the entire intestinal canal. When given in solution, a most satisfactory menstruum is a preparation of yerba santa, known to the trade as yerbarzine (Lilly). The bisulphate should always be prescribed for children, for the reason that it may be given in complete solution without the addition of acid.

Strychnin.—Strychnin on account of its taste is often strenuously objected to, and is therefore better given in tablet triturate form. If the tablet cannot be swallowed, it may be broken into small pieces (not powdered) and mixed with a teaspoonful of orange pulp or in a thick cereal jelly.

Digitalis.—Digitalis, when the tincture or the infusion is used, should never be given when the stomach is empty. It should be administered either after meals or follow the drinking of water or milk. There are few drugs that will so completely destroy a child's desire for food as the digitalis preparations when put into an empty stomach.

Tincture of Muriate of Iron.—The tincture of muriate of iron should be given well diluted after meals in at least one-half glass of water. The child should take it through a glass tube so as not to injure the teeth. In the use of the iron preparations generally, they should be given after meals, and in case the liquid preparations are used, they should be well diluted with water.

VACCINE THERAPY

Vaccine therapy for prevention or cure of infection has for its object the production of an active immunity to the specific bacteria concerned, while serum therapy produces a passive immunity only.

Immunity, which is resistance or lack of susceptibility to a given disease or microörganism, may be natural or acquired. Artificial or acquired immunity may be the result of an attack of the disease itself or it may follow inoculation with living cultures of microorganisms in sublethal doses or in an attenuated state, with dead cultures, or with those products of the growth and metabolism of bacteria known as toxins. Immunity so acquired is active or direct, comparatively slow in appearance, and of comparatively long though variable duration. It is brought about by the development in the blood-serum of substances antagonistic to the vital activity of the bacteria or to the toxins. Such substances are known as antibodies. The serum of an animal which has been actively immunized and which is rich in antibodies may be inoculated into another animal for the purpose of combating infection. The immunity thus produced in the second animal is indirect or passive and of comparatively short duration.

The antibodies are of several kinds: agglutinins, opsonins, and lysins. They are formed by the tissue cells under the stimulus of the infecting bacteria, at first locally, then generally, and are present in the serum and to a lesser extent in the other body fluids. They manifest themselves in certain definite ways demonstrable and measurable by laboratory methods: agglutination reaction, opsonic index, and the complement deviation test. Clinically their increase is accompanied by amelioration of the symptoms of infection. *The aim of both vaccine and serum therapy, then, is to aid the production of antibodies in order to effect a destruction of the invading bacteria and the neutralization of their toxins.* Metchnikoff claimed that the destruction of microörganisms is brought about by their ingestion by phagocytes, especially polymorphonuclear leukocytes. Denys and Leblef proved that there is a substance in the blood-serum which prepares the bacteria for phagocytosis. This sensitizing substance was named "opsonin" by Wright and Douglas, who elaborated methods for its study in the laboratory and for its practical application to the treatment of infections by means of vaccines made of suspensions of dead bacteria.

It has been found in general that the opsonins are below normal

at the onset of an infection and during the height of the acute stage, and that, as improvement occurs, the amount of opsonin in the blood-serum increases. The administration of dead cultures of the bacteria causing the infection stimulates the production of opsonins, as proved by improvement in the symptoms and rise in the opsonic index.

Technic.—In order to estimate the opsonic index it is necessary to prepare serum from the patient, serum from a normal person, leukocytes from a normal person, and a culture of the bacteria from the patient's lesion.

Serum is readily obtained by pricking the finger and catching the blood in a small curved glass tube, as recommended by Wright. The blood is allowed to clot in the tube, and the resulting clear serum is removed by means of a capillary pipet, which is then sealed at its narrow end. The test should be made as soon as possible after drawing the blood, preferably within twenty-four hours.

Leukocytes are obtained from ten drops of normal blood caught in a tube containing ten cubic centimeters of 1.5 percent sodium citrate in normal salt solution. The mixture is centrifuged and the fluid carefully drawn off and replaced by normal salt solution, in order to wash the blood-cells free from serum. After centrifuging again, the supernatant fluid is removed and the upper layer of white blood-cells taken up into a capillary pipet, whose lower end is then sealed in the flame. This is known as the "leukocytic cream."

The suspension of bacteria is made in normal salt solution from an agar-culture not over twenty-four hours old. It must not be too thick and should be free from clumps.

Capillary pipets of similar caliber having been selected, equal quantities of patient's serum, leukocytes, and bacteria are drawn up and thoroughly mixed in one, while normal serum, leukocytes, and bacteria are drawn into another. A control, using normal salt solution instead of serum, should also be made. The pipets are sealed below and incubated for fifteen minutes at 37° C. The mixture is then expelled on a glass slide, thoroughly mixed again, and spread on clean slides. After fixing in methyl alcohol and staining in methylene blue the slides are placed under the microscope and the number of bacteria contained within fifty leukocytes is counted. This gives the phagocytic index, and the quotient of the patient's and the normal phagocytic indices equals the opsonic index of the patient. More satisfactory results have recently been obtained by making the tests with diluted serum, according to Neufeld. The opsonins in the normal blood-serum used for control are found to disappear in a lower dilution than do the immune opsonins in the blood of the patient who has been immunized by the disease or by the administration of vaccines.

The vaccine is made by suspending agar-cultures less than

twenty-four hours old in normal salt solution. Equal quantities of bacterial suspension and of blood from a normal person are drawn into a capillary pipet, mixed, and thinly spread on a slide. The red cells and the bacteria are then counted in a number of fields. Since the normal blood contains five million red cells to the cubic millimeter, the number of bacteria in proportion to the red cells can be estimated per cubic millimeter, and the actual count per cubic centimeter readily calculated. The tube containing the bacterial suspension is sealed and heated for two hours at 60° F. Control cultures are then made to test the sterility of the undiluted suspension. This having been properly accomplished, the vaccine is diluted in bottles of sterile normal salt solution sealed with a rubber cap and paraffin, according to the dose desired per cubic centimeter. Thus, if the actual count showed that five thousand million bacteria were present in a cubic centimeter, diluting the vaccine fifty times by adding one cubic centimeter of undiluted vaccine to forty-nine cubic centimeters of sterile salt solution would make a vaccine containing one hundred million bacteria in one cubic centimeter. Injections of one cubic centimeter or less are made into the shoulder, back, or thigh under strictest aseptic precautions.

Staphylococcus Infections.—It is in these cases that the vaccine treatment has given the best results. While it is always wise to use a vaccine prepared from the patient's own strain of staphylococcus, it is not absolutely essential that this be done. Any stock vaccine which has given good results in a similar case may be used, provided that it has been proved by a culture made from the pus of the patient's lesion that staphylococci are the causative factors. It is essential also to know whether the staphylococcus aureus or albus be present, in order that the appropriate vaccine may be employed. The dose in infants under one year should vary from seven to fifteen millions of dead cocci, and in infants between one and two years fifteen to twenty millions may be given. In children over three years of age twenty to fifty millions may be used. The inoculations are repeated on the sixth to the tenth day if necessary. When the opsonic index is estimated throughout the vaccine treatment of such a case, it is observed that a slight fall in the index follows the injection and that it may be accompanied clinically by a slight feeling of malaise, but no rise of temperature should occur. This constitutes Wright's negative phase of the reaction of immunity, and is followed in one to several hours by a rise in the index and improvement in the clinical symptoms. As soon as the opsonic index begins to fall below the normal on the fifth to the tenth day, another injection is indicated. *As a matter of fact, the test for the opsonic index has been found to be too uncertain to make it practical and worth while to follow systematically, the clinical symptoms being sufficient indication of the value of the vaccines.* Too rapid or too

large dosage must be avoided, because there is danger of exhausting the responding power of the human organism by overstimulation. The temperature should be taken before the vaccine is injected, and every three hours during the following twenty-four.

Furunculosis in young infants has proved readily amenable to treatment by staphylococcus vaccines. Improvement is shown by a much more rapid healing of the furuncles already incised and by the non-appearance of new ones. After the second inoculation improvement is the rule. The amount of pus is lessened and fewer dressings are required in cases so treated. No bad effects from the injections have been noted. It is best to begin with a small dose and increase if necessary.

In **acne** excellent results have been obtained by some observers; others report negative results. Larger doses are usually necessary.

In **otitis media** of staphylococcus origin, vaccines are reported, evidently by enthusiasts, as having proved of value, as also in *suppuration in the antrum*, in *styes*, in *osteomyelitis*, and in *empyema*. It is claimed in the latter disease that operation may, in rare and favorable cases, be obviated by the vaccine injections. After operation the vaccine is said to be of service in aiding the more rapid disappearance of pus from the pleural cavity and hastening the healing of the wound.

Any **local suppuration** due to staphylococci is benefited rapidly by vaccine administration. In *general septicemia* the results have been encouraging (Wright).

Streptococcus Infections.—In all cases of streptococcus inflammations the results of vaccine therapy have been far less brilliant than in staphylococcus cases, but still encouraging enough to warrant their further use. It seems to be essential also, far more than in the staphylococcus injections, that the vaccine be prepared from the strain of streptococcus isolated from the patient. The dose is about one-third that of the staphylococcus: Two to three and a half millions in babies under one year of age, five to seven millions between one and two years, ten to thirty millions in older children.

Erysipelas.—In erysipelas Shorer found that the course of the disease is apparently shortened by the inoculation of dead streptococci, but that neither migration nor recurrence seems to be prevented.

Scarlet Fever.—In scarlet fever the opsonic index to streptococci has been studied by Tunnicliff, who found that it is below the normal at the onset of the disease, but rises when the acute symptoms subside. As local streptococcus complications appear the index falls once more. Favorable results following the injections of dead streptococci in cases of scarlet fever have not thus far been reported. On the other hand, local streptococcus inflammations—*adenitis*, *otitis media*, and *osteomyelitis*—have given most encouraging results.

Gonococcus.—In vulvovaginitis due to the gonococcus in young infants under one year of age, the injections of dead gonococci have had no effect in shortening the course of the disease, in lessening the amount of discharge, nor in causing the cocci to disappear from the vagina. In older children Hamilton and Cooke found that the effect of the dead gonococcus injections is more marked in chronic than in acute cases, the disease being very decidedly shortened in its course. The later stages of the acute cases were also shortened, while no result was noted in the first weeks of the attack. Hamilton and Cooke observed no advantage from the use of a vaccine made from the patient's own organism. The initial dose of five millions was gradually increased to forty or fifty, according to the needs of the case. Injections at eight or nine day intervals proved best.

Pneumococcus.—The few cases of pneumonia in which dead pneumococci have been injected showed no marked advantages over untreated cases. In *empyema* of pneumococcus origin healing has been hastened by inoculations of dead pneumococci (Ross).

Meningococcus.—In cerebrospinal meningitis due to the meningococcus of Weichselbaum vaccine therapy has been tried, but it has become superfluous in view of the brilliant results obtained by means of the anti-meningococcus serum of Flexner and Jobling.

Bacillus Coli Communis.—Inoculations of dead colon bacilli in doses of ten to fifty millions are reported to have given excellent results in cases of cystitis due to that microörganism. The symptoms subside rapidly and the bacilli disappear from the urine in a comparatively short time.

Typhoid Bacillus.—Injections of dead typhoid bacilli have been employed as a prophylactic measure in the English army with fair results. As a curative therapy in children they have not, thus far, been used.

Pseudodiphtheria Bacillus.—In *otitis media* due to this organism Dr. Tunnicliff obtained apparent benefit in some cases by injecting the dead bacilli. The attack of otitis was postscarlatinal and acute.

Tubercle Bacillus.—Local tuberculous lesions have been treated by injections of tuberculin in very small doses with good effect. This is true of chronic local tuberculosis without constitutional symptoms, especially in bone, joint, gland, skin, and eye affections. In pulmonary phthisis of a chronic type, running a nearly apyretic course, tuberculin is also of value. In all acute tuberculous lesions with marked fever and general symptoms tuberculin therapy has proved useless and it may be attended by grave danger. The dose of crude tuberculin[1] administered for purposes of immunization in a chronic tuberculous lesion should be very small, $\frac{1}{5000}$ of a milligram, gradually increased to $\frac{1}{2000}$, $\frac{1}{1000}$, or more. The inoculations should be repeated not oftener than once

[1] Koch's old tuberculin, prepared by the New York City Board of Health.

in ten days, at first, and the temperature carefully measured every two hours. If a rise occurs, the dose has been too large, and must be reduced at the next injection. In selected cases of bone and joint disease and also in adenitis, good results have followed six or eight months of continued treatment, the dose being gradually increased in amount and the intervals shortened to three days. Wright maintains that the opsonic index is an essential guide to the regulation of the dosage. Other observers are satisfied that the clinical reaction is a sufficiently accurate guide. The opsonic index to the tubercle bacillus is low in cases of tuberculosis, unless it fluctuates, due to auto-inoculation from an active lesion. It is the office of the treatment to permanently raise the index.

THE NEW DIAGNOSTIC METHODS

Tuberculin has also been used as a diagnostic measure to detect early, latent, or doubtful cases of tuberculosis, and it may be applied in three different ways: subcutaneously, cutaneously, and in the eye.

Subcutaneous Inoculation.—The dose used for diagnosis is larger than that allowable for immunization purposes, from one-tenth to five or ten milligrams being used, according to the age of the child. The injection is followed in eight to twenty-four hours by a rise of temperature, a certain amount of malaise, tenderness at the seat of injection, and rales over the suspected lung area. The reaction is general as well as local. The temperature falls within twenty-four hours. No reaction occurs in non-tuberculous cases, while in 95 percent of tuberculosis the test is followed by a positive reaction. Absolute exclusion of tuberculosis, however, because of a negative result is not possible. The test is only applicable to cases which do not run a temperature over 37.7° C. (100° F.) and is useful in doubtful and obscure cases. It may be necessary to repeat the inoculations two or three times before a positive reaction occurs, the initial small dose of one-tenth of a milligram being followed in three days by another of one milligram and again, if necessary, in three days by another of three or five milligrams in older children.

Cutaneous Inoculation.—This method of vaccination with tuberculin was introduced by von Pirquet. A small superficial scarification is made on the forearm and a drop of undiluted tuberculin is applied. An untreated scarified area of equal size is made at the same time for control purposes. The reaction begins within twenty-four hours in cases of active tuberculosis. A small red papule forms, surrounded by a limited area of redness and induration. In seven or eight days the nodule has disappeared. The control scarification heals without any inflammatory sign. von Pirquet himself uses a fine boring instrument instead of scarifying. The method is most valuable in infants and children under two years of age. A positive reaction is accepted by von Pirquet as proof positive

of tuberculosis, and a negative reaction, on the whole, means absence of any tuberculous focus. The exception to this rule is furnished by cases in the last days of a fatal miliary tuberculosis, in which the reaction disappears in about half the cases. If only a small focus be present, a second or third vaccination may be required to produce a positive reaction. A rapidly appearing reaction means active tuberculosis, while a delayed reaction means a healed or inactive focus.

Ophthalmo-reaction.—This was first described by Wolff-Eisner and shortly afterward by Calmette, and consists of the instillation of one drop of one-half percent solution of tuberculin into the conjunctival sac of the healthy eye of the patient. Within twelve hours swelling and redness are at their height, and gradually subside in twelve hours more. The plan in use at the Babies' Hospital, therefore, is to instil the tuberculin at midnight. The reaction can then be studied during the entire next day. Wolff-Eisner insists emphatically that only one instillation is permissible in one eye, that a positive reaction means active or latent tuberculosis, and that failure to obtain a reaction in a clinically positive case of tuberculosis means error in technic and not in the method itself. The only exception to this rule, as in the cutaneous method, is that of cases in the very late stage, whose responsive power is exhausted. If no reaction occurs in an apparently positive tuberculous case, the other eye may be used for a second test. Any ophthalmic inflammation, and especially any suspicion of eye tuberculosis, is absolute contraindication for the use of the method. If properly applied in healthy eyes no untoward results occur.

The advantage of both the cutaneous and the ophthalmic methods over the subcutaneous is that they obviate the possibility of spreading the tuberculous process, since no general reaction follows their application. Both local methods are based upon the principle that in the course of a tuberculous infection all the cells of the body are sensitized to the products of the tubercle bacillus. When, therefore, a minute quantity of such products (tuberculin) is brought into direct contact with a sensitized and vascular tissue like the skin or conjunctiva, a rapid inflammatory response occurs.

GYMNASTIC THERAPEUTICS

The section on Gymnastic Therapeutics is included in order to call the attention of general practitioners to the value of such work and to assist them in applying necessary treatment. Exercises are most often used therapeutically for children in the treatment of the following conditions: Flattened or narrowed thorax, kyphosis, scoliosis, flat-foot, congenital ataxias, and acute anterior poliomyelitis; also in cases of habitual constipation, malnutrition, etc.

The following pages contain a description of the methods which have been carried out most successfully with my patients by Dr. Hugh Currie Thompson, New York City, to whose patience and skill I am indebted for the recovery of many cases, some of which had resisted other methods of treatment.

The family physician has an opportunity of seeing these conditions at a much earlier stage than has the specialist, and at a time when they may be more easily corrected than in later life. When discovered, such conditions should never be neglected with the idea that in time the child will outgrow them. Such a belief is often fallacious, for unless properly treated, they are apt to become permanent. The necessity for the correction of physical defects in children is readily appreciated by parents. Certain principles or rules are involved in every form of practice. The following principles are generally applicable in gymnastic therapeutics.

RULES

I. Examination.—As far as possible, obtain a complete history of the case. Make both a general and a careful physical examination; under the latter, note the musculature, condition of the skin, posture, any deviation of the spine, position of thorax and scapulæ, side lines of body, compare length of limbs, note the condition of the feet. It is often advantageous to take the height and weight, and certain measurements, such as girth of neck, chest, and waist, and depth of chest and abdomen. In cases where the nervous system is especially involved apply the tests usually made in such cases.

II. Conditions under Which Exercise Should be Taken.—(*a*) *Temperature of Exercise-room.* The temperature of the room should be from 68° to 75° F., depending upon whether or not the patient is dressed. There should be no draft upon the patient. Therapeutic gymnastics involves fewer groups of muscles than ordinary gymnastic work and the execution is slower. The general circulation and respiration are not stimulated as much and, therefore, the heat production is less.

(*b*) *Clothing.*—In the beginning, the parts of the body involved in the exercises should be devoid of clothing. A single thickness of clothing may mislead as to the corrective effect obtained. At frequent intervals, at least once a week, the child should be uncovered for the purpose of observation during exercises. It is sometimes desirable to have the clothing removed during each treatment. At all times a child's clothing should be simple and hygienic, permitting unhampered movements.

(*c*) *Double Mirrors, etc.*—The use of double mirrors and a stringed screen are sometimes desirable so that the child may see when he has a correct position.

III. Frequency and Duration of Treatments.—Treatment should be for an hour daily, Sundays and holidays excepted. This is not too often, if the following points are considered:

(*a*) The length of time during which the condition has been developing.

(*b*) The number of waking hours intervening between treatments when faulty postures are apt to be maintained.

(*c*) That progress should be made as rapidly as possible, so that the changed structure may be the basis for the period of growth.

Many times this rule must be modified, owing to the physician's lack of time and the expense to the patient's family. From an hour's supervision daily it may mean supervision by the physician only once every two weeks, supplemented by careful home supervision fifteen minutes daily. This arrangement should be the minimum of attention given to any case.

IV. Prescription of Exercises.—(*a*) *Forms of Exercise.*—No certain system of exercises need be followed as long as the exercises used have an anatomic and physiologic basis. Both active and passive movements are used with and without resistance. Exercises with resistance given by the physician are used much in corrective work, for in this form of exercise the physician can easily judge as to the amount of exertion and increase or decrease it at will, and the physician should remember that in most cases the stretching of the contracted muscles is quite as important as the strengthening of the weak and overstretched muscles. In cases of paralysis, injury, kyphosis, and scoliosis, where the weak muscles need treatment to restore their normal strength, the antagonistic muscles which are contracted and shortened should be stretched at every treatment (even though tenotomy has been performed) until the weak groups have regained their normal tone.

(*b*) *Accuracy of Execution.*—Accuracy of execution of each and every exercise given in the prescription is essential. A possible exception to this might occur in the treatment of such cases as malnutrition or constipation, where exercise *per se* is the essential thing, but even in these cases conditions may be such that very careful work is necessary. A prescription of exercise in itself means little.

The manner in which it is executed may actually aggravate the condition, as the wrong muscles may be made stronger by a faulty manner of execution. In writing out a prescription of exercise the physician should be guided by the patient's capability for fairly accurate execution of each exercise. This cannot be gauged by the physical examination alone, but the examination must be supplemented by having the patient try the exercise for one or more days. Unless he can approximate the proper execution without assuming faulty positions or postures and without causing too much nerve and muscle fatigue, simpler exercises should be used. As the patient improves or becomes stronger, more difficult exercises should be given. In advancing, the rule regarding accuracy should be observed.

Exercises have several details which need to be watched in order to secure accurate execution. At first do not confuse the child by requiring absolute accuracy as to every detail; rather select one or two of the more important ones and insist upon the most rigid observance of these. As the child grasps and retains these ideas and is able to carry them out, require more, until all are mastered.

(*d*) *Concentration.*—Frequent repetition of the exercises is necessary to obtain desired results. In repeating an exercise many times, a child easily forms the habit of executing it with but little effort, which will soon result in inattention and carelessness. When this occurs bring about an increase of exertion on his part by insisting that every detail be mastered, or change to more difficult exercises.

(*e*) *Overwork.*—If a child is fatigued at the end of an hour's rest following the treatment, he has been overworked, and the exercises should be made less difficult. A certain amount of muscle soreness must be expected during the first few days of work.

(*f*) *Rest.*—In many cases the child should rest in a recumbent posture for half an hour after the treatment, and in nervous cases the treatment should be preceded by a half hour's rest.

(*g*) *General Health.*—Attention should be given to everything that will build up the general health of the patient, such as bathing, sleep, fresh air, general exercise, diet, dress; suitable furniture (chairs, tables, or desks, etc.) should also be considered. Attention to these things will sometimes shorten the time of treatment by eliminating causative factors.

V. Adaptation of Exercise to Practical Ends.—Adapt corrective positions to all practical ends: walking, sitting, working, or playing.

VI. Coöperation.—Endeavor to secure the coöperation of members of the household, teachers or servants, between exercise periods in order that the progress of the child may be as rapid as possible. A child is not at first capable of adapting the work to practical ends without careful oversight of elders.

There are two objects in treatment: One which should always be obtained, that of improvement; and the other, complete and permanent correction, which should be the aim until an insurmount-

able obstacle is reached. To gain these are required continuous and conscientious work, and the coöperation of those in charge of the child and of the child himself. As a rule, these objects cannot be obtained in a short period of time.

After the treatment has been completed the child should be brought for examination every three months.

POSTURE AND BREATHING

Posture and breathing will first be considered, as they hold an important place in the correction of the conditions about to be considered. A good posture should be maintained during all exercises. Between treatments the child should maintain as good posture as his condition will permit. Telling him to do this is not sufficient, but he should be given exercises which will strengthen the weakened and overstretched muscles and stretch the contracted ones, and thus enable him to assume an improved posture. The work for correcting posture should be taken up gradually. Have a child hold a good posture for short periods of time, beginning with one minute and working up to fifteen minutes. The child should be taught to assume and maintain a good posture during the entire day, no matter what he is doing, whether at work or play. In the standing posture the weight of the body should be brought forward until it rests over the balls of the feet or over a point midway between the toes and the heels. In sitting, the weight of the body should be carried over the posterior third of the thighs.

FIG. 62.—GENERAL POSTURE.

For general posture, my rule consists of the following steps: Heels together, or approximately so, knees well stretched; chest raised high; head erect with chin in (stretch up entire body as high as possible); poise weight forward over balls of feet; bring shoulders back and down. The feet should be turned outward slightly or kept straight. (See Fig. 62.)

In the above rule do not relax any previous step as a new one is taken. In sitting, insist that the hips be pushed well back in order that the child may not slide forward so as to bring the weight of the body over the lower spine.

From the beginning, an attempt should be made to improve the

posture. Take the essentail details for the child to follow and increase the requirements as fast as practicable. These individual details have been tersely expressed in different ways, and one expression may convey the idea of the detail more clearly to one patient and another expression to another. For instance: "Chest Up!" may mean that you wish the child, if he has relaxed, to take the best possible posture of the thorax. In taking a good position of the thorax, there should be no raising of the shoulders, no conscious taking in or holding of the breath, and the trunk should not be inclined backward nor the pelvis or abdomen permitted to project forward.

General Considerations.—1. When children use bicycles, velocipedes, mail wagons, etc., where they propel themselves by pedaling, they should not ride with head and shoulders forward and chest contracted to gain advantage and leverage, but should have the body inclined forward from the hips, back straight, and chest expanded.

2. Improper and insufficient diet, poor assimilation, lack of fresh air, and disturbed sleep cause a loss of general tone, which tends to make a child relax and assume bad postures. All these matters should receive attention. See Tardy Malnutrition, page 164.

3. *Clothing* should be examined to see that it causes no pressure or tension. All garments should be loose and simple. The underclothing should be elastic and light in weight. The stockings should fit the feet and should be supported by soft elastics extending from V-shaped pieces at the side of the waist, which catch the stockings on the outside of the legs. The shoes should have flexible soles, a fairly straight line on the inside, a low broad heel, and should be broad enough to permit the toes to spread. So much depends upon the condition of the feet, both in standing and walking, that they should receive as careful daily attention as the hands. Hats should first be for protection. They should be light in weight and should come far enough forward to protect the eyes from the sun, and should never be worn far enough back to make the child tilt his head to balance the weight, or to make him bend it forward to protect his eyes from the sun. Outside wraps should be sufficiently light in weight and flexible enough to permit free movement in walking or running.

4. *Sleep.*—A child should not form the habit of sleeping always on one side with the knees drawn up to the chest, but change from side to side. If the posture is very poor, he should for some time sleep on the back with limbs extended, and without a pillow. The mattress should be thin and firm, and the child's covering light in weight, and only a small pillow used.

5. *Furniture.*—The furniture a child uses, especially his chairs, tables, or desks, should be adapted to his age and height. Furniture not properly adapted to children is one of the main causes of bad

posture. Chairs should have the height of seat correspond to the length of the lower leg. The child's feet should rest comfortably upon the floor, and there should be no pressure under the knee. The depth of the seat should be no more than the length of the thigh. If it is greater the child tends to slide forward, and assume a bad posture with the weight of the trunk over the lower spine. The back of a chair should not have upright spindles, but cross-pieces, or, at least, one cross-piece sufficiently high above the seat to allow the fleshy part of the hips to project underneath it in order to bring back the tuberosities of the ischii far enough to support the weight of the trunk in a good position. The lower cross-bar, preferably adjustable, should support the back at the junction of the

FIG. 63.— ADJUSTABLE TABLE, DR. MOSHER'S CHAIRS, BOARD, LADDER, AND BLOCKS FOR ATAXIC EXERCISES.

dorsal and lumbar vertebræ. In addition there should be another cross-bar to support the upper back.

Dr. Mosher's kindergarten chair, sold by The Milton Bradley Company, 11 East 16th Street, New York city, is the best chair for children that has come to my attention. It is constructed in three sizes, with seats ten, twelve, or fourteen inches in height, but there is no lower cross-bar for the support of the back. If the seat of a chair is hollowed out, there should be no raised border at the back, as it would prevent the hips from being pushed well back. If well-constructed chairs cannot be obtained, ordinary chairs may be modified for use in the nursery or for older children, by selecting those having a cross-bar several inches from the seat and sawing

the legs off. If the seat proves too deep, a pillow may be placed between the child's back and the back of the chair, but should not extend below the waist-line. It may be held in place by tapes.

6. *Heredity.*—Parents often attribute a bad posture with flat chests or other physical deformities to heredity, saying that a child "takes after" one parent or the other. Heredity is usually only a slight factor, *i. e.*, the child may inherit a frame or general constitution or certain mental and physical characteristics resembling those of a parent, but the faulty posture, flat chest, etc., are in most, if not all, cases acquired. A well-nourished infant has a straight back. In a well child, you seldom see a flat chest before the age of three years.

FIG. 64.—POSTURE EXERCISE.
Chest raising against a flat perpendicular surface

7. In very young children, the deformity is often induced by the position assumed in play. For instance, the sitting position on floor or bed with legs extended and spine bent forward, which most young children assume in playing, keeps the chest in a bad position for long periods of time day after day. This is especially true if, for any reason, the back muscles are not as strong as usual and cannot easily maintain the weight of the trunk in an erect position. For children who are kept in bed when not seriously ill, a folded blanket or air-cushion may be used as a seat, and a bed table or tray, for playthings and meals. A support may be used for the back if needed.

Fig. 63 shows Dr. Mosher's chair and an adjustable table, which may be made for use in the nursery. The top of the table, $2\frac{1}{2}$ by

4 feet (or 3 by 5), is made of well-seasoned boards ½ inch in thickness. These boards are held together by quarter-inch pegs and holes, as are the leaves of an extension dining-table. Two sets of light-weight wooden horses (legs ¾ by 2 inches and cross-pieces 1 by 2½ inches) are used for supports: one set, for use when the child is seated, 14 to 18 inches in height; the other, for use when standing, 24 to 30 inches in height. If desired, the whole may be painted white or stained and varnished. For reading there should be a book-support for the child's books, so that he may keep his head erect.

8. *School Hygiene.*—Physicians as well as parents should interest themselves in school conditions, as often it is in school that the child

FIG. 65.—POSTURE EXERCISE.
Arching body.

contracts bad postures, because of the long hours of confinement, unsuitable desks and seats, and frequently by a lack of proper ventilation.

Exercises.—The following exercises may be used for correcting bad posture:

1. The child stands with toes from 2 to 4 inches from a flat perpendicular surface, as a closed door. Let him assume a good standing position; sway the body forward from the heels (heels kept on floor) until the chest touches the door; but neither the abdomen nor head should touch it. (See Fig. 64.)

2. Raise arms sideways to shoulder height; lift heels; stretch up with head and chest, in with chin, and out with arms.

3. The child lies on his back on a fairly hard, flat surface. Place your hands under his head, raising it an inch or two. He then, reclining as before, arches his body from head to heels. (See Fig. 65.) The knees should be kept straight. In the beginning, as in figure, he may aid himself with his hands in arching body. Later the arms should be folded lightly on the chest.

4. The child standing, should raise arms sideways, turn palms up at shoulder-height, and continue to raise them until the hands are midway between horizontal and vertical; sway body forward; stretch up with chest and head, in with chin, and out and up with finger-tips.

5. Clasp hands, back of head. Raise chest well and press head backward, chin in, resisting with hands. Keep elbows well back.

Walking Movements.—Have patient walk on balls of feet, with arms extended sideways, shoulder high, maintaining a good posture. When capable of doing this satisfactorily, repeat with arms raised over head; arms should be well stretched, fingers straight, palms facing and separated by the breadth of the shoulders.

Shot-bag Exercises.—A flat circular bag, 5 or 6 inches in diameter. The bag should hold from ½ to 2 pounds of shot, according to the strength of the child. With the child's back straight and chest expanded, head erect and chin close to neck, have him balance the shot bag on top of his head: balance while sitting or standing from 1 minute up to 30 minutes; balance while rising from a sitting to a standing position from 5 to 50 times; balance while walking forward and backward across the room from 5 to 20 times; balance while walking on the toes across the room forward and backward from 5 to 20 times; balance the bag on the head while being read to; balance while taking the out-of-door walk for varying distances from 100 feet to ½ mile; balance while running in an easy manner.

Following easier exercises the shot bag is also useful as an exercise in the treatment of chorea or ataxia when there is incoördination of the neck muscles.

BREATHING

The primary object of breathing is to aërate the blood by carrying oxygen to it by the air that enters the lungs; secondarily, through the practice of deep breathing, the accessory muscles of respiration are developed, the breadth and depth of chest and the lung capacity are increased. In deep respiration the amount of air taken in is several times that inhaled in ordinary respiration. The amount inhaled in "tidal" respiration by an adult is 30 cubic inches, while that which can be taken in by forced inspiration is from 150 to 300 cubic inches. Daily practice of deep breathing in the open air helps to increase the resistance of the lungs to diseases to which they are liable.

A mistake is sometimes made in overdeveloping the chest muscles, so that the chest becomes to a certain extent "muscle-bound," and the expansion is lessened, instead of increased. There is little danger of this when the development comes from taking deep inspirations rather than by muscular activity alone. While a development of the chest muscles is desirable, they should not be developed at the expense of the normal expansion of the "respiratory chest." The aim should be to improve the mobility of the chest and the lung capacity as well as to strengthen the muscles.

Two kinds of breathing are usually spoken of: *thoracic* and *abdominal*. Breathing should be considered as a whole, unless one form is especially lacking, as, for instance, where a child has a very flat chest in which diaphragmatic or abdominal breathing greatly predominates over the thoracic, and there is little mobility in the upper part of the chest. If the abdominal breathing needs to be developed, have the child stand in a good posture, with hands placed lightly over the lower ribs, with tips of the fingers two or three inches from the median line, and take long, deep breaths until he secures a good movement of the lower ribs. The hands are placed over the ribs, only for the purpose of feeling the movement.

All breathing exercises should be taken with the body in a good position and may be done while standing, lying, sitting, or slowly walking. Ordinarily they are taken in a standing position. If the muscles are weak or if it is difficult to stand in a good position, they may be taken in a sitting or reclining position. When the breathing exercise is taken reclining, a couch or a board resting on two chairs may be used in preference to a bed or the floor. A small hard pillow or a folded bath-towel may be placed under the shoulders and upper back, but should not extend under the head. Such a pad is used with advantage in cases of kyphosis and lordosis.

It is better to take the deep breathing exercises in the open air, on the highest elevation in a nearby park, or during the daily outing, or even while walking to and from school, or while driving. But one must adapt himself to existing conditions, and if taken at home they may be taken on a piazza or balcony, or even indoors, with wide-open windows, but the air should be as free from dust as possible. If the windows are open in winter, the child should wear extra wraps or clothing.

A breathing exercise should be preceded by a number of strong, sharp exhalations through the mouth in order to empty the lungs as thoroughly as possible of residual air, so that the deep inspirations may fill the lungs with fresh, pure air.

The clothing should always be loose, with no constrictions at neck or waist.

Holding the breath at the end of full inspirations may be done to advantage, if it is not held longer than five seconds. Retaining

the air after full inspiration causes it to become warmer. As it becomes warmer it expands and penetrates the better into the alveoli. Retaining the air from one-half to one minute or longer is not wise. Becoming warmer, it continues to expand and may overdistend the alveolar walls. Prolonged holding of the breath has also a deleterious effect upon the heart.

If, when the child begins to take deep breathing exercises he feels dizzy, he should not at first fill the lungs to their greatest capacity, or hold the breath, and each deep inspiration should be followed by several ordinary ones. After a few days the dizziness usually ceases.

In all cases, deep breathing and respiratory exercises should be given. They are of special value in malnutrition, constipation, flat chest, and scoliosis.

Breathing Exercises.—Take a good standing posture.

1. Inhale deeply and exhale slowly.

2. Place hands lightly on lower chest. Inhale deeply; exhale.

3. Place hands lightly on upper chest, elbows well back and down. Inhale deeply; exhale.

4. Inhale as arms are raised sideways to shoulder height. Exhale as arms are lowered.

5. Inhale deeply as arms are raised forward and upward, to a vertical position. (From the beginning have elbows, wrists, and fingers straight, palms facing each other and separated by the breadth of the shoulders.) Exhale as arms are lowered sideways.

6. Inhale as arms are raised sideways to vertical. (Elbows, wrists, and fingers straight—turn palms up when arms are shoulder high.) As vertical is reached, bend head slightly backward, stretch up and continue inhaling, while you slowly count three. Raise head; exhale as you lower arms sideways. (See Fig. 66.)

In the illustration the wrists are strongly flexed and the palms are not turned, in raising to vertical. The action is stronger. Either position of the hands may be used.

7. Arms at sides, elbows, wrists, and fingers extended. In one quick, continuous movement raise arms forward and flex forearms upon the chest, palms down, elbows drawn well back. At the same time a step forward is taken—the weight of the body is supported over the forward foot, the ball of the other foot resting on the floor. With the above movement inhale deeply. Exhale as the arms are lowered to side.

In Nos. 4, 5, 6, and 7, above, put the emphasis on the upward movement. In lowering the arms, keep chest high and arms well stretched, but make the movement an easy one.

If the heart is weak, in the above exercises the arms should not be raised above the level of the shoulders, and all the exercises should be done more slowly and with less exertion. If the breathing becomes labored, or the countenance shows signs of interference

with circulation, the child should rest until pulse and respiration return to their usual rate.

Where deep respiration is an end in itself, in addition to the preceding breathing exercises, others which favor involuntary deep breathing should be given. It is important that a good posture be maintained throughout.

FIG. 66.—BREATHING EXERCISE.
Inhale as arms are raised, sideways, upward, to vertical.

Exercises for Younger Children.—1. Walking up-hill at a moderate pace without stopping.

2. Running in place, *i. e.*, executing a running movement without advancing.

3. Distance running—from fifty yards to a mile. The minimum distance to begin with, and the maximum distance to work up to in accordance with the general condition and age of the child.

4. Running games, such as rolling a hoop, playing tag, etc.

Exercises for Older Children—in addition to those just mentioned:

1. Games, such as hand-ball, basket-ball, tennis, and football as played by boys.

2. Swimming for distance, when accompanied by a competent person in a boat.

FLAT CHEST

In flat chest the weight of the body is usually carried too far back, the abdomen and head being too far forward. The chest is flattened, with ribs depressed, and there is interference with the proper expansion of the lungs. The shoulders often droop forward. The posture is one of general relaxation.

Flat chest is of common occurrence among children during the years of school-life. It should be carefully corrected on account of the deleterious effect on the lungs and abdominal organs. The necessity for its correction should be impressed upon the child. Attention to posture and breathing is essential. The aim should be to give exercises which will strengthen the muscles of the back and neck, deepen and broaden the chest, and increase its elasticity

FIG. 67.—BACK EXERCISE.
Raise head and chest high.

and breathing capacity. In addition to the exercises given under Posture and Breathing, I have found the following of benefit in these cases:

1. Have the patient lie prone on a hard, flat surface, hold the ankles while the patient raises head and chest as far as possible;

the arms extended and raised with the body, the backs of the hands being turned toward each other with the thumbs up. In the first few treatments, the thumbs may be clasped. Hold position for from two to five seconds, or while counting from one to five or ten. (See Fig. 67.)

2. With knees straight, bend trunk forward until the hands touch the floor in front of the toes, or come as near to floor as possible, then raise the body to best possible standing position. Keep weight well over balls of feet, raise the chest as high as possible, stretch the arms well down at the side; wrists, fingers, and elbows straight. Hold this position for from two to five seconds or while from five to ten are counted. The primary value of the exercise is in the elevation of the chest; secondarily, the back muscles are strengthened and, in bending forward, the muscles that elevate chest are relaxed so that they are better able to give a strong contraction when the body is raised.

3. Have patient seated on a stool or low chair and stand behind him. Patient swings straight arms forward upward to vertical, palms facing. He then turns palms forward and grasps your hands and pulls his elbows backward and downward close to sides. As he pulls them downward resist his movement.

KYPHOSIS

Kyphosis, as considered here, is an increase of the normal curve in the dorsal region of the spine, commonly called "round-shoulders," produced by weakened muscles and bad habits of posture, or sometimes by improperly arranged clothing, and by the occupation of the child. These causative factors should be removed as far as possible, and, as in all the deformities of childhood, attention should be given to posture, breathing, arrangement of clothing, etc.

The treatment given under Flat Chest is appropriate here, as the two conditions are often associated. The following exercises may be added:

1. Raise arms sideways to height of shoulders. Bend head backward with chin drawn in and at same time turn palms strongly upward. When patient has learned to do this well, as the head goes back the arms may be raised to vertical.

2. Flex forearms upon chest, palms down and elbows well drawn back, shoulders level. Incline head slightly backward and fling arms forcibly sideways.

3. Raise arms sideways to shoulder level, turn palms up, make three short circles with arms, stopping with the backward movement. Raise arms a few inches, stretch out and up. Bring arms backward and downward to sides. (See Fig. 68.)

4. *Hanging exercises:* A short curtain pole, $1\frac{1}{4}$ inches in diameter, may be placed in a doorway at desired height. Strong enough sockets can be obtained at a hardware store.

(*a*) Hang with overgrasp.

(*b*) Hang and swing.

Hanging is of much value in kyphosis and flat chest on account of its effect upon the spine and spinal muscles.

(*c*) Holding patient (see Fig. 69); trunk of patient resting against your body.

(*d*) Holding patient; upper back resting only against body.

Exercises "*c*" and "*d*" are used for the passive stretching of the lumbar and dorsal portions of the spine. The dependent part of patient's body acting as weight to stretch the spine. Hold from one-fourth to one-half minute. Repeat several times.

FIG. 68.—CHEST EXERCISE.
Stretch arms strongly.

5. Patient sitting on stool or chair with arms forward midway between horizontal and vertical, palms facing. Make resistance as arms are separated backward and downward. (See Fig. 70.)

6. Forearms flexed upon upper arms, hands closed and facing the front of shoulders. Strongly rotate forearms outward and backward. (See Fig. 71.)

7. Patient sits astride a stool and raises the arms sideways. With an assistant, either the child's mother or nurse, on one side, and yourself on the other, each grasp the patient's hand with one hand and place the other hand on his back in the region of greatest deformity. Have the patient pull the elbows close backward and downward to the sides, against resistance. At the same time gentle and firm pressure is made on the back.

8. Patient sits on stools, places hands low on hips, fingers forward and wrists straight, elbows drawn well back. Let him bend forward from hips with back straight. Place your hands over the regions of greatest deformity and have patient raise the body against resistance. The back must be kept straight, head erect, and chest

Fig. 69.—Weight of Pelvis and Lower Limbs to Stretch the Lumbar Spine.

well arched. When the patient can do this well, his hands may be placed on the back of the neck, instead of on the hips.

9. The patient stands, raises arms sideways, shoulder high; bends trunk forward from hips, back straight, and raises arms to vertical.

10. Patient lies face downward over end of couch or table, the whole body straight, hips and thighs only, resting on table and held.

Hands back of neck. Bend body forward until the chest touches the seat of a chair, then raise body as high as possible. (See Fig. 72.)

11. While the patient is in dorsal recumbency, with one hand hold his knees firmly to prevent his body moving and have the other hand under his shoulders. Have an assistant (any adult) draw the patient's arms as strongly as possible in a line with his head and body, but away from them. When this is done, with the hand under the shoulders, gently but strongly raise his shoulders and body several inches from the table, hold while you count from five to ten, lower, and relax. Repeat from five to ten times.

FIG. 70.—SIT BEHIND PATIENT AND GIVE RESISTANCE ON BACK OF WRISTS AS HE SEPARATES HIS ARMS.

12. With children who are not strong begin with exercises in a reclining posture:

(*a*) Reclining position. Arms extended at right angle to the body, palms facing each other. Separate arms against resistance.

(*b*) Reclining position. Arms extended beyond head in line with the body. Bring arms sideways, downward, against resistance.

(*c*) Deep breathing.

(*d*) No. 3 under Posture Exercises, but body arched only from hips upward, instead of from heels.

In the treatment of kyphosis or flat chest with lordosis this exercise may be given. While a child is taking deep breathing or chest raising alone, lying in a dorsal position with or without the shoulders being raised by some supporting object, place your hand under the small of his back; after the chest has been fully raised, have him endeavor to press his back against your hand without lowering his chest. This may be done from fifty to one hundred times. Later, the same exercise may be done in sitting or standing positions, the lumbar region being pressed backward while the chest is elevated and forward. The lumbar spine should be brought back only until the entire back is in one straight line.

The spinal muscles should be massaged to make them pliable.

FIG. 71.—BRING FOREARMS BACK AS FAR AS POSSIBLE.

SCOLIOSIS

Scoliosis, or lateral curvature of the spine, is a condition in which the spine deviates in whole or in part to one side or the other of the median line. It is accompanied by the rotation of the vertebræ, though in some cases the amount of rotation is so slight that it is not easily detected; in other cases the rotation is marked in comparison with the amount of lateral curvature.

The treatment of curvatures resulting from such diseases as tuberculosis or caries of the spine, rickets, etc., will not be considered, but only the simple curvatures which occur in cases of general debility, muscular weakness, or are the result of faulty habits of posture, a short leg, certain occupations, etc.

Diagnosis.—In the treatment of scoliosis, much depends upon a careful diagnosis. As far as possible all the etiologic factors should be ascertained: the heredity, general constitution and temperament of the patient; the general appearance, condition of skin, the musculature, its structure and tonicity, should be closely

scrutinized. The patient's habits of posture while standing and sitting, especially when he is unconscious of observation, should be studied carefully. Inquiry should be made as to position during sleep, and if a school-child, concerning the desk, and chair and position while writing, etc.

For examination the back should be bared down to the level of the trochanters, when the height of shoulders, height and prominence of hips, position of the scapulæ and their relation to the spine, the lines running from the tips of the ears to the tips of shoulders, and the position of arms as they hang at the sides, should all be noted. The position of the spine itself and its relation to points mentioned should also be closely observed, when

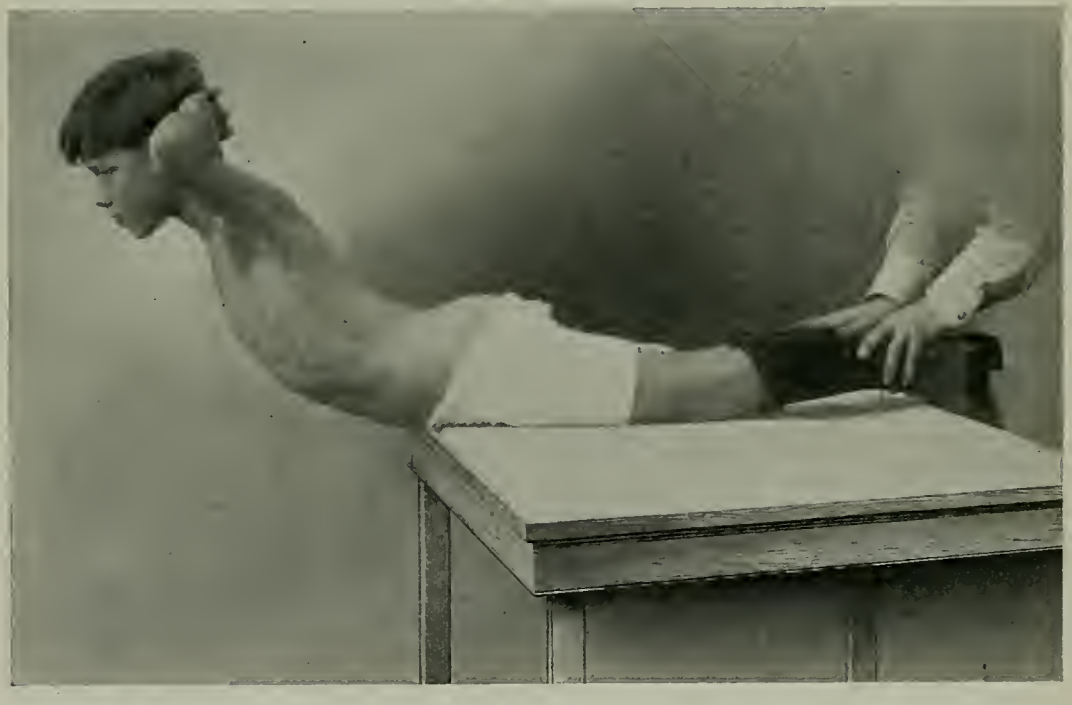


FIG. 72.—MOVEMENT MAY START FROM POSITION OF COMPLETE FLEXION OR PARTIAL FLEXION WITH BODY RESTING ON SEAT OF CHAIR OR ON SHORTER STAND OR TABLE.

the patient is standing in his usual posture, and again when he is standing in his best possible position. The position of the spinous processes should be marked with a flesh pencil and the curve carefully studied out; the contour and relative size of legs should be noted and the feet should be examined. To ascertain the amount of rotation, the patient should be made to take the Adam's position.[1] If any difference is found in the height of the hips, a careful measurement of the legs should be made. Another important point to be determined is the flexibility of the spine, for to a great extent the diagnosis depends upon this.

On the front of the body, the position of ribs, end of sternum, umbilicus, and the tension of the abdominal muscles should be noted.

[1] Patient stands with heels together, knees well stretched, bends body forward from hips; head and arms hanging forward.

Besides the above examination, it is well to inquire into the history of the patient, as to diseases of childhood, present ailment, liability to certain diseases, as to amount of exercise both outdoors and indoors, and as to the condition of the digestive organs. Examine heart and lungs. Certain measurements may be taken, such as height, weight, height sitting, girth of neck, chest, waist, hips, biceps, calves and insteps, depth of chest and abdomen, and breadth of shoulders, chest, and waist.

I have found the best method of recording to be by photographing the patient, using a thread screen, the spinous processes and lower border of scapulæ having been outlined with flesh pencil or dots of ink. To record the rotation, a lead tape may be molded across the posterior thorax at point of greatest convexity, while the patient is in the Adam's position, and the tape carefully removed and its outline traced on paper.

The curve may be a single long curve, a double, or a triple one. Endeavor to find out which is the primary, and which the secondary or compensatory curve, for the normal position of the spine is the result of the adjustment of the weight of the body around the center of gravity, in order to balance the body while standing or sitting, and if there is a change in the normal adjustment of the weight in one part, there must soon be a corresponding change elsewhere, so that if there is a left convexity in the lumbar region there will be a compensatory curve to the right in the dorsal.

Treatment.—The treatment should be both general and local. In the general treatment, carry out a thorough hygienic régime, which includes exercise in the open air, baths, attention to diet and bowels, clothing, and general light exercise for muscle-building and stimulation of the circulation, respiration, and digestion. One of the most important things is to train the habits of posture.

Special Treatment.—Massage and exercises which act strongly upon the spine itself, and suspension, with and without pressure, I have found most useful. It is occasionally of benefit to have a patient wear a plaster cast or leather jacket during the day, between treatments.

At first only general movements are given, those in which both sides of the body are used equally, such as those found under Posture and Breathing, and adding, a little later, the exercises under Flat Chest and Kyphosis, with simple movements of the body to strengthen the spinal muscles and make the spine more flexible.

The following may be used: body-bending forward, backward, to right and to left, and body-twisting to right and left. These movements may be done sitting or standing, and with the hands at the hips, back of neck, or extended over head.

In giving a new exercise, the body should be bare, in order that its effects may be carefully noted.

In giving corrective bending and twisting movements, the bending should be toward the side of the convexity with added pressure at the point of greatest curvature, and the twisting movement toward the side of the concavity with pressure over the point of the convexity. The following are some of the special exercises:

A typical S-shaped curve, convexities, right dorsal and left lumbar, has been taken to illustrate the treatment. These exercises can be reversed. A single or triple curve will have to be studied out with back bared.

FIG. 73.—SPINE BEING STRETCHED BY WEIGHT OF BODY, PRESSURE OVER CONVEXITIES.

1. Hanging from bar; pressure over convexities. (See Fig. 73.)

2. Hanging from bar. Place your hand over point of greatest convexity, and push patient's body sideways.

3. Hanging from bar. Have patient extend the leg corresponding to the side of lumbar convexity backward against resistance.

4. Lying prone on table; left hand on neck, right on hip: raise body. (See Fig. 67, but with hands placed in accordance with text.)

5. Lying prone on table; hands on neck. Carry patient's legs toward the convexity of the lumbar region.

6. Patient sits astride a stool; hands back of neck. Twist body to left; make pressure over right dorsal region.

7. Sitting on stool; left hand back of neck, right at hip; right leg extended backward. Bend body forward: resist patient as he raises body, using pressure over convexities. (See Fig. 74.)

8. Standing: flex forearms on upper arms, with fingers pointing over shoulders. Extend left arm upward and right arm downward and backward, and extend left leg backward.

9. Using wand, that is about twelve or fourteen inches shorter than the height of the body; grasp at ends, with elbows straight; swing strongly from front of thighs to the right, sideways, backward, until the wand is at a perpendicular and in line with the spine. The body arches from heels to head. (See Fig. 75.)

"Key-note position."[1] Left arm extended upward; right arm sideways. (See Fig. 76.)

FIG. 74.—BODY RAISING WITH PRESSURE OVER CONVEXITIES.

10. (*a*) Take "key-note position" standing. Stretch body for from two to five seconds.

(*b*) Take "key-note position." Marching on balls of feet.

Do not give more than three or four special exercises in any one treatment, and follow each of them with a marching exercise, such as 10–*b*, or some breathing exercise.

[1] Key-note position is the position of arms by which the spine assumes its best position.

CONGENITAL ATAXIAS

The ataxias of childhood, to which we refer, are *hereditary cerebellar ataxia* and *hereditary spinal ataxia.* Most observers have described them as beginning to develop at the age of eight or ten

FIG. 75.—SWING STRONGLY TO THIS POSITION WITHOUT BENDING ELBOWS.

FIG. 76.—KEY-NOTE POSITION.

Arm corresponding to low shoulder is raised. Used to maintain a better position of the spine during certain exercises and marches.

years; one or two observers have mentioned a much earlier period, stating that the symptoms generally appear at the age of three or four years, and that the cases may be congenital.

Cases upon which this treatment is based were congenital; the development of the physical movements was retarded and defective

from the beginning, and in one case of hereditary spinal ataxia the physical act of nursing was also defective.

Hereditary cerebellar ataxia is characterized by the involvement both of the upper and lower limbs at the same time, although the upper limbs may not be ataxic to the same degree as the lower. The gait is reeling, uncertain, with the feet wide apart, body bent forward, the weight of the body being supported mainly upon the balls of the feet, the toes inclining inward, locomotion at times being interfered with by the crossing of the legs. One leg is usually more ataxic than the other. The reflexes may be increased. The speech is hesitating, defective, and explosive, but audible.

Hereditary spinal ataxia (*Friedreich's ataxia*) is characterized by its beginning in the lower limbs, gradually extending to the upper limbs, and finally involving the organs of speech. The symptoms are vertigo; swaying from side to side on standing; marked muscular weakness, especially of the extensors and abductors (paralysis may follow); contractures of the flexors and adductors; scoliosis and talipes resulting, first, postural, through muscular weakness, later becoming fixed; rheumatoid pains; and diminution or loss of the patellar reflex; the head is held to one side in a clonic spasm, but turns from one side to the other every day or two; one leg is more ataxic than the other. The movements are characterized by rigidity and incoördination; the articulation is scanning and explosive, and oftentimes, for days, the patient cannot speak above a whisper.

Dana states that there may be a *mixed* or *transitional* hereditary cerebellar and spinal ataxia.

Some observers state that there is defective mentality, and that the patients possess a violent temper. I have not found either to be true—the temper being no different from that which you would find in a little patient otherwise ill for as long a period, and who was not perfectly understood. The speech, or the poise of the head, may suggest deficient mentality, but I have found these children affectionate, observing, and rational, and showing hereditary indications of brightness in mechanical, mathematical, or methodical lines.

In beginning treatment, study the patient's capability for coördinate action. Do this throughout the entire course. When you have decided upon the exercises to be given, show them to the patient in detail, explaining them fully, so that he may understand what effort is required, and occasionally, in teaching, repeat these illustrations and explanations.

Accuracy is of the first importance. If there is lack of control in movement, pause and hold patient in correct position while you count from one to four or ten before resuming movement. Follow that practice as long as it is necessary, and at every tendency toward losing control. Slow and accurate work first, later more rapid work.

While learning an exercise of coördination permit patient to use his eyes to watch his limbs, in order that the coördinate centers may thus be reinforced or aided. Next rely only upon his muscular sense for correct execution, and at last have the eyes closed in order to eliminate the relationship of surrounding objects, which might aid in the execution. A reclining posture is assumed for coördinate training, where the patient is unable to stand.

Do not expect a child to coöperate with you in attention or efforts to make his physical movements accurate when he is left to himself, for it is rarely done. The coördination must become reflex. The training must be carried to the extent of unnecessary capability. "The keynote" must be, as with the orthopedist, over-correct, for the correct execution of work under observation would not be sufficient to insure coördinate action, the moment a child attempts to do things alone, or when he is tired, or when his attention is given to other objects.

The aim in treatment should be in keeping with a child's natural sphere in life. Childhood is the time of muscular activity and growth; it is the period of play and games. When a child is able to play at all, if left to himself he will not stop, for rest, when he begins to tire or fall; he will do so only when the game is ended, and his companions finish. Play, therefore, serves only to increase the incoördination, because of overexertion. To make a child capable of walking or running at all, makes him eager to play when others play; but it is like the fencing or boxing of two men, one of whom completely outclasses the other, whose native quickness and strength are completely overcome; he has neither the opportunity to show them nor the mind to use them. The ataxic child, in playing with normal children, besides tiring more quickly, being outclassed, becomes bewildered and cannot seize the opportunity to attempt coördinate action.

No satisfactory results can be expected from the treatment of ataxia, unless it is continued until the child is able to play as well as other children. The treatment should be made practical as soon as possible. Do not spend unnecessary time on gymnastics or apparatus. When a child shows that he is able to take one step, begin walking exercises, going up and down stairs, and running.

Study the patient's movements, and analyze his defects in execution. To tell a child not to fall when he is walking, and expect him to be able to avoid falling, is not fair to the child. He does not know why he falls, and his attempts to avoid it only increase his general nerve tension. His falling may be due to one of several causes: it may be that he is walking with his feet widely separated; if so, he gets but little support from the advancing foot, and upon fatigue, diverting of attention, or striking a small obstacle, he will fall. When he permits his feet to separate, he should at once be directed

to keep them close together. By so training the child, it will become easier to keep his feet in position, and, if there is no other defect, falling will unconsciously be avoided. So all of his work must be analyzed to discover its weaknesses or defects.

General gymnastics have no place in the treatment of ataxia, but where certain groups of muscles are weak, movements may be given to strengthen them, in order that they may do their part in coördination. Throughout the greater part of the treatment I have used exercises for strengthening certain groups of muscles, although their primary value was not to improve coördination. It is well to have these movements executed against resistance, in order to determine the amount of muscular power the patient possesses.

Coördinate efforts at balancing and walking are first made upon the floor until the child shows a little improvement, but it is difficult to make a child realize the necessity for using all of his energies in the effort, when he knows that there is no particular danger; therefore apparatus is necessary to force coördination. Boards, blocks, and ladders (see Fig. 63) are used, not for the purpose of developing ability to perform exercises upon them, but to develop unconsciously the habit of constant care and watchfulness, as the child can readily appreciate the fact that, without such precaution, he will slip and fall; he also learns that he cannot relax, whenever he is inclined to do so, as he might were he on the floor.. By this apparatus work, children unconsciously acquire the ability to control themselves in places of danger into which their play leads them.

Always place some incentive before the child, as otherwise he rarely puts forth the necessary exertion. His interest, attention, and muscular and nervous energy must be exerted. Tell him that it is necessary to do a certain amount of work before the treatment is over; that, when a certain amount is done, the treatment for the time will be over, whether the hour is up or not. Tell him that he must do something more than he did the day before, whether it takes longer than the hour or not. If it takes longer than the hour, he will learn that you mean what you say, and sometimes the entire work of the hour will be executed in the last few minutes, despite the fact that the fatigue of the previous efforts makes it more difficult.

While we wish to avoid fatigue, a certain amount is harmless. If a child remains fatigued at the end of an hour's rest, following the treatment, and he does not coördinate as well as before the treatment, provision should be made for more rest during the next treatment. A child's inertia needs to be overcome in spite of fatigue. It will teach him that merely saying he is tired will not enable him to escape the work. This has been impressed upon me by seeing how, after fifty-five minutes of unsuccessful effort, a child

will "pull himself together," as it were, and do a new exercise that may really be difficult, in order that he may be able to leave at the end of the hour.

Never permit a child to suffer a fall or injury during the treatment. Never take any risks with your patient. (See Fig. 77.) Falls cannot be prevented in ordinary walking, or running, except by words of caution, which should always be used; however, they should not be used in tests when the patient is endeavoring to see how far he can walk or run before he falls. On the first fall, make him return.

Experience teaches a patient distrust of his ability to do a thing

FIG. 77.—WALKING ON A NARROW BOARD SEVERAL FEET ABOVE THE FLOOR.
An advanced exercise in coördination.

which he has never tried, or, having failed after several trials, he will naturally say he cannot do it, and not wish to attempt it. Confidence must be inspired in him to follow directions unhesitatingly by insisting upon his accomplishing every task given him, and thus proving his ability to do it, and also by showing him that his interest is yours, and that you have never permitted him to be injured during his unsuccessful attempts.

With a child it is not enough to secure coördinate action, but you must secure endurance along the lines of reflex, coördinate action. Coördinate action with one who is ataxic calls for general tension, and the unnecessary accessory action of groups of muscles

is fatiguing, and results in excessive waste of nerve and muscle energy. To teach a child to do his work easily and to carry on prolonged coördinate effort is thus accomplished by the same means. A parallel can be found in a person learning to skate or swim. Here we have a general tension and the general action of all the muscles of the body—a great waste of energy to prevent one from falling, or going under the water—and even after one has learned how to swim, much of that nervous waste of energy will continue until he has thoroughly mastered the art. Endurance and conservation of energy are very desirable in an ataxic.

After he had been in training for several months one patient walked forward, without stopping, five hundred feet on the top of a fence, and backward one hundred and twenty feet without stopping. The same child walked several miles up and down a mountain-side without stopping, his mind occupied with observation and not applied at all to his walking, save in response to caution. He was able also to run half a mile without stopping or falling. It is not for the purpose of making the child a long-distance walker or runner that, after he has learned to walk or run properly, the distance is gradually increased to one or more miles, telling him to "take it as easy as possible" without stopping, although when fatigue is noticed sufficient rest should be given. It is common to see normal children of three or four years of age run and play for long periods of time without apparently tiring—our object in endurance exercises is to fit the patient for a child's sphere in life. Gradually the muscles become inured to fatigue, do their work with a minimum expenditure of force, and to a certain extent recuperate while in action.

Short periods of retrogression must be expected occasionally throughout the entire course. When a child is tired, has had excitement, or when he is indisposed, one must expect a temporary loss of coördination. Parents too should be prepared for this, and not be disheartened when it occurs.

The life of an ataxic child should be quiet and free from excitement. Judgment should be used about allowing him to mingle with other children, even though they are members of his own family. When allowed to play, it should be with younger children, if possible, or with his nurse, or mother, until the time of playing with other children is made a part of the treatment, and even then it should be confined to lines permitted by the one in charge. In the intervals, a child needs sufficient quiet and rest, so that he will completely recuperate, and be in the best possible condition for the next treatment, as the treatments afford the only hope of restoring him to nerve stability and normal muscular movement. As he improves, however, the daily régime should vary. As a rule, a child should rest, lying down from one-half hour to an hour before

treatment, and the same length of time after treatment, and, in fact, at any time during the day when incoördination becomes marked.

Attention to the general health of the child is important. There should be a simple and nutritious diet, careful attention to the bowels, daily bathing, an outdoor life, taking the treatment whenever possible in the open air. These things should not be neglected, as these patients are apt to have less resistance to disease than non-ataxic children.

Illness does not cause a retrogression except temporarily through the weakness which follows it. With returning health and strength, progress continues.

Coöperation is important. It is more necessary here than in any other chronic ailment. A child will recover in one-half the time if coöperation is conscientiously given by those in charge of the child. For illustration: the child is capable of walking, but walks on the balls of his feet, or crosses his feet frequently, causing him to lose his balance easily; whenever he does it, if he is called back, no matter what his object may be for going, until he has walked across the floor correctly, the next time he starts to walk it will not be necessary to call him back as many times, and the constant correct walking will gradually make it a reflex habit. If he is permitted to walk incorrectly it encourages incoördination and a careless habit. The course of nervous stimuli has been likened to the making of a new path in a jungle. Constant use will make it easy to travel, but if the old path of incoördination is used instead, the new path of coördination remains a difficult task for a much longer period of time. The lines of least resistance are followed, and the new must be made as easy as the old if we would have a child use it.

Treatment should be for an hour daily. More than an hour's treatment is apt to produce general nervous fatigue. An ataxic child may need training along many lines, and the attempts to do one thing correctly may require so long a time that it is unwise to attempt to give work for the correction of all at one treatment. If this is attempted, nothing will be well done in the hour, and the work will only serve to tire the patient and increase the incoördination. It would take a normal person, who could do the movements well, more than one hour to cover all the lines with improvement in each. An hour has been spent in endeavoring to walk a plank once without falling off, but the child did it before the treatment was completed, and the next day he did it twice, so there was evident progress. When one morning hour is given to the lower limbs, work might be mapped out so that an assistant, the mother or nurse, could give another hour, or half hour, in the afternoon to exercises for the arms and fingers, or to massage, which would improve the nutri-

tion of the tissues and the general circulation, so as to insure a better general response of the nerves and muscles. Another half hour could be spent in training the speech of the child. In this way the correction of the upper limbs and speech could progress at the same time as that of the lower limbs, instead of waiting until after the coördination in the lower limbs is first secured.

Improvement in one line does not imply any special improvement in another. Walking, running, going up and down stairs, jumping, and hopping must each be taken up separately. It is particularly true, in case one is working for improvement in the lower limbs, and little attention is given at the same time to the upper. At the end of the time devoted to locomotion, the ataxia of the upper limbs is but little improved.

Parents and physicians occasionally think that a child will outgrow his ataxia, but this is a mistake.

A patient should hold as good a posture as possible at all times, as the weight of the body is then better adjusted. One or two exercises under Posture should be added to the treatment. The suggestions about clothing, under Posture (page 537), are especially valuable here.

Five or ten minutes once or twice a day should be devoted to a sitting posture in which the body is held erect, but the limbs relaxed, and every part of the body entirely at rest. This aids greatly in overcoming the nervous instability and irritability, and is a valuable help in securing general nervous control.

When giving the patient his treatment there should be no one else in the room, unless it is one whose presence would aid in securing better attention or work from the child.

There is difference in the treatment of congenital ataxias and that of locomotor ataxia: In one case the patient is a child, in the other an adult. With the child, between treatments there is little or no coöperation; with an adult there is coöperation. During the period of development a child's sphere is that of play and muscular activity. The adult looks forward only to returning to his business or professional activity, and stops treatment when his proficiency and coördination permit this.

Exercises.—In the beginning, when the child cannot walk, exercises should be taken while lying down. For the lower limbs, they consist of coördinate flexions and extensions, abductions, adductions, and circumductions, actively and against resistance, and of touching certain designated points or objects with the feet separately. In cerebellar ataxia one can more readily advance to the standing exercises, and take foot-placings (floor may be marked for this), stepping out to side, front and back and to the ordinary oblique positions, forward and backward. The weight of the body is carried by the advancing foot, so that when the movement is completed

the weight rests equally over both feet. Taking a step is now practised, bringing up the other foot to the side of the foot advanced. This is done sideways, forward, and backward. Two or three steps are now attempted, a pause being made after each one until a perfect poise of the body is obtained. This is continued until the child can walk across the room. At this time the defects shown in the walking should receive attention.

The defects in walking or running are usually the following: carrying the weight of the body too far forward; not straightening the knees completely; the reeling gait; the crossing of the legs; walking with the feet separated; turning the toes inward; not lifting the feet sufficiently; not bringing the heels to the ground. As occasion arises, show the child his defects, and caution him against their repetition. In walking and running in the room, repeat the exercise if any faulty execution is noted. Instruct the members of the household, who have charge of the child, never to ignore these defects, but always to insist upon their immediate correction. In the outdoor walking or running, the patient should always be in advance of you, so that his every movement may be observed. It is here that the correction of the defects should mainly take place. The following four movements aid in correction, and should be given every day for quite an extended period, in order that the weakened muscles may be strengthened for the required work of coördination:

(*a*) Drawing up the knees against resistance;
(*b*) Flexing the feet against resistance;
(*c*) Abduction of feet against resistance;
(*d*) Extension of legs against resistance.

In the full extension of the legs, the feet must be kept flexed.

The child being able to walk across the room, work is begun upon the apparatus; boards from 7 inches down to 1 inch in width by half an inch in thickness and 10 feet in length, of well-seasoned hardwood; a ladder, the sides of which are $1\frac{1}{2}$ by $2\frac{1}{2}$ inches, 10 feet in length, and the rounds $\frac{7}{8}$ inch in diameter by 12 inches long, placed 10 inches apart in the ladder; 24 blocks of wood, 2 inches in thickness and 12 inches wide by 14 inches long. Beginning with the 7-inch board, have the child walk over and back, with the arms in different positions, the eyes open and the eyes shut; one end of the board placed upon one block, and so on until one end is resting upon ten or more superimposed blocks. The board is placed upon supports of equal height, beginning with one block under each end, increasing the height until the board is about five feet from the ground. At each increase in height the various exercises are repeated. (See Fig. 77.) Two five-inch boards can be used when placed upon the same supports, the boards being about eight or ten inches apart. The child can step from one board to the other, going from one end

to the other; and, standing in the center, he can step forward and backward from board to board. With boards placed together, walk forward and backward, the boards bending unevenly, as one foot is on each board.

Using the blocks alone, arrange them for walking, at varying distances from each other; also make piles uneven in height, and have patient walk with the eyes open and the eyes shut on the blocks.

FIG. 78.—WALKING ON ROUNDS OF LADDER, ONE END RAISED SEVERAL FEET ABOVE FLOOR—AN ADVANCED EXERCISE IN COÖRDINATION.

Ladder Exercises.—Ladder flat on the ground, walking forward in the spaces between the rounds; walking sideways and walking backward. Place one end of the ladder upon a block and add blocks gradually until the ladder reaches the height of the child's knee; then begin

with both ends of the ladder placed on single blocks, gradually increasing the height until the ladder reaches the height of the knee; after each change of height the walking exercise forward, sideways, and backward is repeated. When using the blocks the child may bring them from the pile and build the steps that he is to walk upon; standing upon the block previously placed upon the floor, he bends forward, placing in position the one he carries, repeating the process until all the blocks are arranged. When through walking over the blocks, he stands on the one next to the last one placed, bends over and picks up the last one, and may carry it back to the pile, walking over the blocks, or he may lift and raise it above the head, and pass it, either forward or backward, to you. The block may be carried by the child walking through the spaces of the ladder, and both ladder and blocks may be arranged in various forms to be walked over by the child.

You may now take up the balancing work, where the weight of the body is carried on only a portion of the sole of the foot, as in walking on the rounds of the ladder. The ladder is first placed flat upon the ground, and the walking is done forward and backward. This is graded by raising one end of the ladder until the child can walk up and down on the rounds several times without a mistake, the ladder raised to an angle of 35°. (See Fig. 78.)

In beginning the treatment, the child is instructed not to allow one foot to step directly in front of the other. By this time coördination is sufficiently mastered so that balancing as an exercise may be taken up, using the boards from 2 inches down to one inch in width. On these boards the child must place one foot in front of the other, and walk forward across it; next, walk backward, eyes open and eyes shut.

When a child is able to walk fifty or sixty feet without falling or stopping to rest, the distance is gradually increased in outdoor walks, correcting defects when noticed, until he can walk a mile or more without their occurrence or without falling.

When able to run across the room in a straight line, teach running in a circle. Watch closely his running and do not allow the feet to be widely separated, or the weight of the body to incline too much forward. He should run with a firm stride and raise his feet well. Increase distance until he can run half a mile without falling or stopping to rest. Later teach running up and down hill; running short distances, as from eighty to one hundred feet, as fast as he can, and stopping without falling; trying to catch a person; racing with another child, who starts at a sufficient distance behind him, so that they will finish at about the same time; running to catch a person who will dodge and run zig-zag and in circles. Playing with other children in running games, such as "cross-tag," "pull away," etc., having the other children so handicapped that by exerting himself to the

utmost he will not be caught. During these games, if he falls, he should be obliged to run around the grounds once alone.

Other indoor exercises are: whirling on one foot fifty times without falling; repeat on the other foot; alternate thus with eyes open and eyes shut; running in a short circle fifty times without falling. Such exercises are helps to the running out of doors. Another helpful exercise is running several hundred feet out of doors, whirling around in the direction indicated whenever the command "turn right," or "turn left," is given, without falling.

Walking Up and Down Stairs.—Begin with one or two steps and gradually increase until the length of the flight is reached, seeing that the feet are not separated, but that they advance in straight lines directly in front of the body. In walking up stairs, carry the weight of the body over the foot that is on the upper stair. In walking down stairs, be sure that the heel is brought against the back of the stair, so that the foot at no time will rest on the edge. Keep the hands close to the sides of the body while walking up and down stairs with the eyes shut. Run up and down stairs with the eyes open and again with eyes shut, carrying articles while running. Always be near enough to the child for his protection in case of accident. The object is to train the muscular sense and make the coördination sufficiently reflex to enable the child to run or walk up the stairs alone without the danger of an accident.

Jumping.—Draw a line with a piece of chalk; teach the child to incline his body slightly forward, bending knees a little, spring forward, aided by an upward swing of his arms. Jump for height and distance over the rounds of the ladder, from one space to another, and repeat, skipping one space. Jump from block to block, the blocks being separated at varying distances. Jumping over blocks; running and jumping.

Hopping.—Hopping is much more difficult, as the spring is from one foot alone, and the landing on the same foot. In addition to the coördination necessary to balance upon one foot, is added the required effort to lift the body from the ground and the coördination required for balancing the body on landing, so as to avoid falling. The training is about the same as in jumping; hopping with either foot over a string; hopping for distance; hopping for height; and making a succession of hops on the same foot, without touching the other foot to the ground; the running hop.

At the close of these exercises it may not be amiss to repeat what was stated at the beginning, that it is not desired to make the child an athlete, but distance walking, distance running, fast running, jumping, and hopping are exercises which children use in their play for long periods of time, and the coördination secured by the apparatus work is often of value in places of danger where their play is often apt to lead them. Coördination to this degree should be secured.

Exercises for the Upper Limbs.—In the beginning, the general movements of the fingers, wrists, forearms, upper arms, and shoulders may be practised, executing them slowly until the coördination is perfect in these movements. The above exercises are simple movements of flexion, extension, rotation, and circumduction. The educative movements, however, have mainly to do with the fingers.

1. Flexing and extending the fingers.

2. Slowly and gently touch the tip of the thumb to the tip of each finger and hold them together without pressure while five is counted.

3. Simultaneously touch the tip of each finger to the tip of the thumb.

4. Flex strongly the index-finger so that the end will touch the base of its second metacarpal bone.

5. Flex strongly and adduct the thumb so that the tip of the thumb will press the tip of the little finger.

6. Flex strongly and adduct the thumb so that its tip will press the base of the little finger.

7. Needles: have them graded from the largest to the smallest size, grasp a fine thread between thumb and each finger of one hand in turn, and thread each needle; repeat, using the other hand.

8. Buttons: have them graded from the largest to the smallest obtainable, and have them sewed on to one strip of cloth, another strip of cloth having buttonholes to correspond. Practise buttoning and unbuttoning with thumb and index-finger of each hand.

9. Pins: picking them up with fingers. Pick up the pins and press them through a stiff pasteboard box, forming various designs.

10. With a pencil correctly held, make squares, triangles, parallel lines, etc., with and without dots as a guide.

11. With a pencil correctly held, make figures and letters both large and small.

The child can also use the exercises of piling coins and chips, touching hanging balls, placing pegs in holes, and similar games. Also throwing and catching a ball. A child should be made to dress and undress himself, and to feed himself, although as exercises, at the beginning, he may do them only in part.

In eating, the spoon or fork should never be full, and the cup or glass should be only partly filled. The execution of the movements should be slow.

Exercises for the Speech.—A child should be taught to enunciate numbers and letters distinctly. An interesting book should be read to him, reading one or more words at a time, and requiring him to repeat them correctly after you.

Friedreich's Disease.—In a well-marked case, begin treatment with massage to improve the nutrition of the weakened and atrophied muscles and to help relax the spasm in the contracted muscles. In con-

nection with the massage, passive exercise of the limbs is given and gradual and persistent extension is made upon the contractures, endeavoring to gain a little each day until the limbs are fully extended; then increase from day to day the time during which the limb is held at full extension and abduction. The degree of motion in the joints is utilized by giving active movements. In order that the muscles may become stronger, slight resistance is given to these movements, and greater attention paid to the strengthening of the weaker groups of muscles. When the muscles have moved the limbs as far as possible, the extension must be completed by stretching or by pressure. A child should be taught how to turn over, after pushing up his arms out of the way. When lying prone he should try to draw up his knees under his body, and when his arms become flexible enough and strong enough, he should raise up his body until he rests on his hands and knees; later he is required to raise himself until he is sitting upon his legs, which are flexed underneath his thighs. Have patient raise his body from a reclining to a sitting posture, with legs extended. Let him sit in a chair, which is low enough to permit him to place his feet upon the floor, but without any supporting arms. Let him rise from a sitting to a standing posture by drawing back his feet underneath him, and inclining his body slightly forward, then straightening up to a standing posture. Have him balance, upon standing, from a few seconds to several minutes, stretching his body up to its full height. Give foot-placings, then let him attempt a few steps, pausing after each step to straighten up, balance and "make himself tall." From this point the treatment is the same as that of the ataxia of the cerebellar type, except that the massage and work for overcoming the contractures must be continued indefinitely, or the progress will be slower.

ANTERIOR POLIOMYELITIS

Exercises should include action of all the groups of muscles of the limbs. The exercise of the muscles that are normal, or but little impaired, stimulates the nutrition of the neighboring impaired muscles.

With the patient in a reclining position the thighs may be flexed, extended, abducted, adducted, and circumducted against resistance when possible. The leg may be flexed and extended, and the foot may be flexed, extended, abducted, and circumducted. These movements may be passive at first; later, when possible, they may also be taken standing. Flexion and abduction of the foot and extension of the toes are results which will come last.

A faint response is sometimes seen after friction over the superficial points of the nerves supplying these muscles, or when the limb is immersed in hot water, and when seen the movements should

be completed passively. As the muscles show signs of returning functions, the movements are repeated frequently during the day, but always stopped when the responsive motion becomes weaker, in order that fatigue may be avoided. When possible, the lightest resistance should be given, so that the power of the muscles may be better ascertained, and their work thus gradually increased by increasing the resistance. An added stimulus may be given by having the normal limb execute the movement with the paralyzed limb. Occasionally, movement is secured in all but one toe. Where there is improvement in any way in the paralyzed limb, the treatment should be continued, for cases have shown that muscles may respond to treatment even though there may be no faradic reaction for more than a year.

When the patient is able to walk, walking and marching exercises should be taken up, such as walking on straight lines to and from certain objects, walking on the toes, walking with the arms sideways shoulder high, and with arms in a vertical position. The blocks, board, and ladder that are used in treating ataxic patients previously described are of use here. A trough or the use of a narrow ladder with sides six or eight inches in width serves to help the patient overcome the outward throw of the paralyzed leg. Although the dimensions of the ladder are different, the walking exercises outlined in the treatment of ataxia may be followed in part. In walking, the patient should endeavor to keep the foot flexed as much as possible, touching the heel first in bringing down the foot. The following may also be given: walking on the heels for a short distance; jumping; climbing a ladder, using hands and feet; running, but do not permit an outward throw of the paralyzed leg, it must advance straight forward; hanging from a bar, swinging both legs forward, sideways and backward, keeping heels together, and with feet apart. A light basket-ball or foot-ball may be used for kicking. Have patient practise the drop-kick, and show you how hard he can kick.

Exercises for the Arms.—Flexion, extension, abduction, adduction, and circumduction of the upper arm; flexion, extension, and rotation for the forearm and wrist, with and without resistance. Have patient close hand as tight as possible, showing how hard he can strike. Have him catch a basket-ball and practise throwing it into a high basket at different distances. Drop a tennis-ball into his hands to catch; also toss and bound it for him to catch. Have him throw a tennis-ball for height and distance. The tendency is to throw the ball downward. Some of the special finger movements used in the treatment of ataxia, such as approximating the tip of the thumb and the tips of the fingers, the button exercise, the work with the pencil, etc., may also be given. (See page 568.)

Passive Exercises.—Where there is any tendency to contracture

in the groups of muscles not paralyzed, or in which the degree of paralysis is only slight, passive exercises should be given to secure a normal range of motion of the contracted groups either in leg or arm. This must be kept up throughout the treatment for the purpose of lessening or overcoming the tendency to deformity. Care should be used, however, in not carrying the passive motion beyond the normal range.

Resistance applied to movements of contracted muscles serves to stretch them more than does the passive stretching.

Massage.—Gentle, deep-kneading, light clapping and hacking, friction over the superficial points of the nerves, and general friction should be given to the entire limb.

Light hacking, vibration, and deep-kneading should be given to the spinal muscles.

Fifteen minutes of massage should be given once or twice daily as long as the treatment is needed.

CONSTIPATION

In addition to the measures suggested in a previous section (pages 181–186) for the relief of constipation, gymnastic exercises may be brought into use.

These exercises are given with two objects in view: one, to strengthen the abdominal walls, which mechanically stimulate the intestine; the other, to stimulate the general circulation, which quickens the portal circulation and increases the activity of the liver.

The first five exercises are taken from a reclining position.

1. The knees straight and feet extended. Raise both legs until they are at a right angle with the body.

2. Knees straight. Raise heels about four inches above couch; separate them as widely as possible; bring them together, and lower to couch.

3. Knees straight. Raise heels ten or fifteen inches above the couch. Draw up the knees as close to the chest as possible, without raising heels. Extend the legs without raising or lowering the feet. Lower legs to couch.

4. Feet held, or secured by strap. Raise body to sitting position without use of hands. The hands may be placed upon the thighs, folded upon the chest, placed back of neck, or the arms may be extended beyond the head. Changing the position of arms in the order named increases the exertion.

5. Feet held. Circle trunk sideways, forward, sideways, backward to the starting position. Starting to right and left alternately. Arms position as in number four.

6. Hang from bar or round of ladder. Execute No. 1. (The position of body changed, but the relation of legs to body same as in No. 1.)

7. Hanging position. Execute No. 2.

8. Hanging position. Execute No. 3.

9. Hanging position. Heels together, swinging legs from waist, describe as large a circle as possible with the feet.

Each of the above exercises may be followed by a deep-breathing exercise.

In a weak patient, the detail of straight knees need not, at first, be insisted upon. If necessary, the patient may be assisted, the weight of the legs or body being partly supported until the patient is strong enough to execute it alone.

10. Sitting on chair or stool. Hands placed back of neck, twist body right and left against resistance.

11. Sitting position. Hands back of neck, bend body right and left against resistance.

Exercises for the General Circulation.—Taken from a standing position.

1. Bend trunk forward, touch floor with fingers, keeping the knees straight.

2. Take a long step forward, bend the forward knee; bend trunk forward; touch the floor with fingers. Raise trunk, step back to position. Alternate feet in stepping.

3. Stand with feet two foot-lengths apart. Raise arms sideways to shoulder height. Bend right knee and bend trunk to right side, touching floor with right hand. Raise body. Same to left.

4. "Chopping." Stand with feet separated, fingers interlaced. Bend body forward, swinging hands to floor between feet. Raise body, swinging hands up over right shoulder, at same time twisting to right. Swing to floor. Same to left.

5. Hop, feet apart, then together, quickly.

6. Run in place—*i. e.*, without advancing.

(*a*) With front of thighs kept in same plane with front of body, heels striking buttocks in running.

(*b*) With each step in running, raise the knees as high as possible in front of body.

The running and hopping should be done quickly, and continued long enough to get the body thoroughly warm.

Passive Exercises.—1. Trunk-rolling. Patient in a sitting position, feet separated and fixed. Grasp him by the shoulders, and with a continuous movement bend the body to the right, forward, left, back to the starting position. After the movement has been given several times, reverse the direction.

2. Thigh-rolling. Patient in a semi-reclining position. Grasp patient's foot with right hand, his leg just below the knee with left. Raise thigh and circumduct it, the knee describing as large a circle as possible.

Exercises with Resistance.—1. Reclining position. Flex and extend thighs.

2. Semi-reclining position, with knees drawn up. Abduct and adduct thighs.

The prescription for treatment may be arranged in this order: active exercises, passive exercises, exercises with resistance, ending with some deep-breathing exercises.

FLAT-FOOT

Flat-foot is a condition in which the ligaments and muscles of the foot are abnormally weak, and in which the anterior posterior arch may be partially or wholly depressed and flattened.

The leg is rotated inward and the foot everted; the weight of the body falls on the inner side of the foot; the interior malleolus is prominent; the entire sole of the foot rests on the floor; and when the feet are placed side by side and the toes and heels touch, the natural concavity of the inner line of the foot is replaced by a convexity. The patient complains of pain or weakness, and the tissues of the sole are weak and flabby.

There are different methods of examining the outlines of the sole of the foot: standing with the foot on a plate of glass so that the sole of the foot may be seen from beneath; smearing the sole with vaselin and standing on a piece of blotting-paper; smearing it with charcoal and standing on a piece of white paper, etc.

The patient should have proper rest. He should frequently sit with feet elevated, and avoid exhaustion. When standing, he should occasionally invert the feet, and, when walking, walk with the feet parallel, as the Indians do, and for short distances walk on the outer borders of the feet.

The feet should be cared for each day, giving attention to the nails and to bathing. Apply hot and cold water alternately, and rub vigorously in order to stimulate the muscles and the circulation.

The feet should be properly clothed; the stockings should be even, smooth, and loose, but should not heat the feet. The shoes should be broad enough to permit free use of the muscles of the feet; the toe of the shoe should point slightly inward, and the inner border may be raised; the heels should be low and broad.

The general condition of the patient should be carefully considered, his general tonicity—for its impairment will affect the condition of the feet. Judgment should be used in the care and use of the feet in rheumatism, and during and shortly after convalescence where there is a general relaxation of muscles and ligaments. Malnutrition and obesity, if present, should receive attention while the feet are being treated.

In severe cases, in the beginning, the patient should be kept en-

tirely off of his feet, and given only passive exercises, massage, and bathing.

Exercises.—1. Reclining or semi-reclining position. Extend foot against resistance.

2. Reclining position. Adduct and invert foot against resistance.

3. Reclining position. Circumduct foot inward, upward, and outward with resistance applied to the inward and upward motion.

4. Standing position. Raise on toes.

5. Standing position. Raise on toes; turn heels outward; lower heels slowly to floor.

Passive Exercises.—1. With one hand hold heel firm, at the same time pressing on the astragalus with an outward, upward motion of the thumb, while the other hand adducts, inverts, and flexes the foot. This may be done under hot water if the deformity is marked.

2. Extension of foot.

3. Adduction of foot.

Massage.—Deep-kneading, vibration, and clapping may be given to the foot and to the muscles of the calf of the leg.

A gauze pad may be placed under the arch, and held by adhesive plaster or a rubber bandage, until a well-fitted plate can be made, which should be used for support in the intervals between treatments, until the muscles and ligaments have gained sufficient strength to hold the arch in a normal position.

DRUGS AND DRUG DOSAGE

FOR INTERNAL USE

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Acetanilid.				
Not advised in the treatment of children.				
Acid, Arsenious. See *Arsenic.*				
Acid, Benzoic. Benzoic Acid, Flowers of Benzoin				
Used in cystitis of alkaline type.....	gr. 1	gr. 1–2	gr. 2	gr. 3–5
Acid, Gallic.				
Bismuth Subgallate. (Dermatol.)				
Used internally as an intestinal astringent, also externally,.....	gr. 3–5	gr. 5	gr. 10	gr. 10
Acid, Hydrochloric, Dilute. (Corresponding to 31.9% of absolute HCl.)				
Used in chronic gastritis with atony of the stomach.....	gt. $\frac{1}{4}$–$\frac{1}{2}$	gt. 1	gtt. 2	gtt. 3–5
Acid, Lactic.				
Used in fermentative diarrheas. Given best well diluted with syrup and water and at 2-hour intervals.....	..	gt. 1	gtt. 2	gtt. 3–5
Acid, Phosphoric, Dilute. (Containing 10% Orthophosphoric Acid.)				
Used as a stomachic	gtt. 1–2	gtt. 2–3	gtt. 5	gtt. 10
Acid, Salicylic.				
Seldom used uncombined.				
Bismuth Subsalicylate.				
Intestinal astringent and sedative ...	gr. 1	gr. 1–2	gr. 2	gr. 3–5
Methyl Salicylate. (Synthetic Oil of Wintergreen.)				
Antirheumatic	gt. 1	gtt. 2–3	gtt. 3	gtt. 3–5
Oil of Wintergreen. (Natural.)				
Antirheumatic	gt. 1	gtt. 2–3	gtt. 3	gtt. 3–5
Salol. (Phenyl-salicylate.)				
Intestinal antiseptic and antirheumatic	gr. $\frac{1}{2}$	gr. 1–2	gr. 2	gr. 3
Sodium Salicylate.				
Antirheumatic	gr. 1	gr. 1–2	gr. 2–3	gr. 3–5
Aspirin. (Non-officinal.) (Acetyl-salicylic Acid.)				
Antirheumatic,—a substitute for Sodium Salicylate, being less irritating to the stomach. Best given in capsules, for it is decomposed by alkalies and by moisture	gr. 1	gr. 1–2	gr. 2–3	gr. 3–5
Acid, Tannic.				
Used in the form of:				
Tannalbin. (Dried Albuminate of Tannin.)				
Used as an intestinal astringent	gr. 1–2	gr. 1–2	gr. 2–3	gr. 3–5

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Acid, Tannic (*Continued*).				
Tannigen. (Acetyl-tannin.) Used as an intestinal astringent	gr. 1–2	gr. 1–2	gr. 2–3	gr. 3–5
Also by rectum: 1% solution of Tannic Acid in an enema, for dysentery or colitis.				
Acid, Tartaric.				
Seldom used except as one of its salts.				
Potassium Bitartrate. (Cream of Tartar.) Diuretic, refrigerant, and aperient. Used as an ingredient of diuretic drinks. To one pint of water to be drunk in twenty-four hours, is added:.....		ʒ2		ʒ4
Potassium and Antimony Tartrate. (Tartar Emetic.) Used as an expectorant. Its action is too violent for use as an emetic. Best given alone or with Ipecac in a tablet or in a mixture with a simple elixir.				
May cause severe gastro-enteritis in too large doses	gr. $\frac{1}{200}$	gr. $\frac{1}{150}$	gr. $\frac{1}{100}$	gr. $\frac{1}{100}$
Potassium and Sodium Tartrate. (Rochelle Salt.) Laxative	gr. 15	gr. 30	ʒ1–2	ʒ3–4
Aconite. (Aconitum Napellus.) (Root contains 0.5% Aconitin.)				
Tincture of Aconite Root (10%). Used in a beginning fever as a circulatory sedative and an analgesic	gt. $\frac{1}{4}$	gt. $\frac{1}{2}$	gt. 1	gtt. 1–2
Alcohol. (Ethyl Alcohol, Spirits of Wine.) Best given as Whisky or Brandy for a general stimulant toward the end of an illness or as a last resort.				
Brandy. (Spiritus Vini Gallici, containing 39–47% alcohol by weight.)	gtt. 5–10	gtt. 10–20	gtt. 20–30	gtt. 30–40
Whisky. (Spiritus Frumenti, containing 44–50% alcohol by weight.)..	gtt. 5–10	gtt. 10–20	gtt. 20–30	gtt. 30–40
Sherry Wine. (Vinum Xerici, containing Alcohol 15–20% by weight.)...	..	gtt. 30	gtt. 45–ʒ1	ʒ1–2
Aloes. Not advised in the treatment of children.				
Alum. Not advised in the treatment of children.				
Ammonium.				
Ammonium Bromid. See *Bromin.*				
Ammonium Chlorid. (Sal Ammoniac.) Stimulating expectorant; best given dissolved in half an ounce of water.....	gr. $\frac{1}{4}$	gr. $\frac{1}{4}$–$\frac{1}{2}$	gr. 1	gr. 1–2

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Ammonium (*Continued*).				
Ammonium Carbonate. (Sal Volatile.) Stimulating expectorant; best given dissolved in half an ounce of water	gr. ¼–½	gr. ½–1	gr. 1	gr. 1–2
Solution of Ammonium Acetate. (Liquor Ammonii Acetatis or Spirits of Mindererus.) Stimulating expectorant; best given well diluted in carbonic water. Used also as a diuretic, antipyretic, and diaphoretic	..	ʒ½–1	ʒ1	ʒ2
Aromatic Spirits of Ammonia. (Spiritus Ammonii Aromaticus.) Used as a stimulating expectorant, volatile stimulant, carminative, and antispasmodic. Best given well diluted with water	gtt. 3	gtt. 3–5	gtt. 5	gtt. 5–10
Antimony.				
Antimony and Potassium Tartrate. (Tartar Emetic.) See under *Acid, Tartaric.*				
Antipyrin. Analgesic and sedative in pertussis and laryngitis. Best given alone in powder form, or with Sodium Bromid in solution	gr. ½	gr. 1–1½	gr. 2	gr. 3
Antitoxin. See *Serum, Antidiphtheritic.*				
Apomorphin. Not advised in the treatment of children.				
Arsenic.				
Arsenious Acid. (Arsenic Trioxid or White Arsenic.) Used in anemia, malaria, and chorea. Administered either in solution (see Fowler's Solution) or in tablets with other ingredients. In large doses it is an irritant poison causing puffiness of the eyes and gastro-enteritis, both of which are signs of an overdose. Cannot be given with astringents, tinctures, or decoctions, or with solutions of Iron. Antidotes are Hydrated Iron with Magnesia, egg-albumen, and emetics. Given three times a day	..	gr. $\frac{1}{200}$	gr. $\frac{1}{150}$	gr. $\frac{1}{100}$
Fowler's Solution. (Liquor Potassii Arsenitis.) Uses, action, and antidotes are the same as Arsenious Acid. Best given in water into which it is freshly dropped	gt. ½	gt. 1	gtt. 2	gtt. 2–5

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
ASAFETIDA.				
Emulsion of Asafetida. (Milk of Asafetida.)				
Used chiefly as an ingredient of enemata, especially in excessive tympanites. To 8 ounces of diluent.....	..	ʒ1	ʒ1	ʒ1
ASPIDIUM. (Male-fern.)				
Oleoresin of Male-fern.				
Teniafuge.				
Best given in emulsion or in capsules.....	..	..	gr. 10–15	gr. 20–30
ASPIRIN. See under *Acid, Salicylic.*				
ATROPIN. See under *Belladonna.*				
BASHAM'S MIXTURE. See under *Iron.*				
BELLADONA. (From the leaves of the *Atropa Belladonna*, containing 0.35% of alkaloid.)				
Atropin. (Alkaloid of Belladonna.)				
Respiratory stimulant, antihidrotic.				
Used as a stimulant, a mydriatic, and for the cure of enuresis.....	gr. $\frac{1}{500}$	gr. $\frac{1}{300}$	gr. $\frac{1}{250}$	gr. $\frac{1}{200}$
Tincture of Belladonna (10% leaves).				
Uses similar to Atropin.....	gt. $\frac{1}{4}$–$\frac{1}{2}$	gt. 1	gtt. 1–2	gt. 3–5
Belladonna Leaves. (Asthma Powder.)				
Used occasionally with the leaves of Conium and Stramonium, and Potassium Nitrate (Saltpetre) to relieve attacks of asthma. To be burned in a metallic receptacle.				
BENZOIC ACID. See *Acid, Benzoic.*				
BICHLORID OF MERCURY. See under *Mercury.*				
BISMUTH.				
Bismuth Subcarbonate.				
Intestinal astringent and sedative...	gr. 10	gr. 10	gr. 10	gr. 20
Bismuth Subgallate. (Dermatol.)				
Intestinal astringent and sedative. Used also externally.....	gr. 3–5	gr. 5	gr. 5–10	gr. 10
Bismuth Subnitrate.				
Intestinal astringent and sedative...	gr. 5–10	gr. 10	gr. 10–15	gr. 20
Bismuth Subsalicylate. See under *Acid, Salicylic.*				
BLAUD'S PILL. See under *Iron.*				
BORAX. (Sodium Borate.) See under *Sodium.*				
BRANDY. See under *Alcohol.*				
BROMIN.				
Used only in the form of its salts.				
Ammonium Bromid.				
Sedative. Used in laryngismus, pertussis, asthmatic bronchitis, and sleeplessness.				
Best given well diluted with water...	gr. 1–3	gr. 2–4	gr. 3–5	gr. 5–8

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
BROMIN (*Continued*).				
Potassium Bromid.				
Used same as the Ammonium salt, but it is more depressing	gr. 1–3	gr. 2–4	gr. 3–5	gr. 5–8
Sodium Bromid.				
Used same as the above. It is midway between the Ammonium and the Potassium salts in its depressant action.	gr. 1–3	gr. 2–4	gr. 3–5	gr. 5–8
Strontium Bromid.				
Used same as the above	gr. 1–3	gr. 2–4	gr. 3–5	gr. 5–8
BROWN MIXTURE. See under *Liquorice.*				
CAFFEIN.				
Citrate of Caffein (50% Caffein).				
General stimulant and diuretic	gr. ½	gr. ½–1	gr. 1	gr. 1–2
CALCIUM.				
Calcium Chlorid.				
Of some benefit in hemophilia and purpura hemorrhagica	gr. ½	gr. 1	gr. 1–2	gr. 2
Calcium Sulphid.				
Antipustulant	gr. $\frac{1}{30}$	gr. $\frac{1}{20}$	gr. $\frac{1}{20}$	gr. $\frac{1}{10}$
Prepared Chalk.				
Antacid	gr. 2	gr. 3	gr. 5	gr. 5–8
Compound Chalk Mixture. (Mistura Cretæ Composita.)				
20% Chalk Powder, 40% Cinnamon-water.				
Antacid. Every 2 hours	℥1	℥1	℥1½	℥2
CALOMEL. See under *Mercury.*				
CAMPHOR.				
Powdered Camphor.				
Used in coryza. Every 2 hours	gr. $\frac{1}{10}$	gr. $\frac{1}{5}$	gr. ¼	gr. ¼
Spirits of Camphor (10% in Alcohol).				
Stimulant, anodyne, carminative	gtt. 3	gtt. 5	gtt. 5–10	gtt. 10
Water of Camphor. (Aqua Camphoræ.) (Contains 0.8% of Camphor.)				
Used as a vehicle.				
CANTHARIDES.				
Used best in:				
Tincture of Cantharides (10%).				
Useful in cystitis and functional albuminuria	..	..	gt. ¼–½	gt. ½
CAPSICUM.				
Used best in:				
Tincture of Capsicum (10%).				
Used as a carminative and stomachic. Best given well diluted in water	..	gt. 1	gtt. 2–3	gtt. 3–5
CARDAMOM.				
Used best as:				
Tincture of Cardamom.				
Used as a carminative	gtt. 5	gtt. 10	gtt. 15	gtt. 20
CASCARA SAGRADA. (Bark of the Rhamnus Purshiana.)				
Extract of Cascara Sagrada.				
(Four times the strength of the bark.)				
Tonic laxative	..	gr. ½	gr. 1–2	gr. 3–5

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Cascara Sagrada (*Continued*).				
Fluidextract of Cascara Sagrada. (Aromatic.) (1 c.c. = 1 gm. bark.)				
The active principles are retained, but the bitter principles are eliminated.				
Tonic laxative	gtt. 15	gtt. 30–45	ʒ1	ʒ1–2
Castor Oil. (Oleum Ricini.)				
(Expressed from the seeds of Ricinus Communis.)				
Bland oil and cathartic.				
Given usually for one dose	ʒ1	ʒ2	ʒ3	ʒ4
Cerium Oxalate.				
Sedative in vomiting	gr. 2	gr. 2–3	gr. 3	gr. 3–5
Chalk. See *Calcium.*				
Chloral Hydrate.				
Sedative, hypnotic, and antispasmodic.				
Best given in some bland fluid by rectum		gr. 1	gr. 1½	gr. 2
Chloroform.				
Given internally as:				
Spirits of Chloroform. (Chloric Ether.) (6% Chloroform.)				
Carminative, antispasmodic, and sedative	gtt. 2–3	gtt. 3–5	gtt. 5–55	gtt. 15–20
Water of Chloroform. (Aqua Chloroformi.) (0.5% Chloroform.)				
Vehicle and carminative	ʒ½	ʒ½–2	ʒ2–3	ʒ4
Cinchona. See under *Quinin.*				
Cocain, or:				
Cocain Hydrochlorid.				
Local anesthetic by hypodermic injection.				
Used in 0.2% to 4% strength. But seldom used for local anesthesia in children. Used by the mouth in obstinate vomiting	..	gr. $\frac{1}{100}$	gr. $\frac{1}{50}$	gr. $\frac{1}{25}$
Codein. See *Opium.*				
Cod-liver Oil. (Oleum Morrhuæ.)				
Fixed oil from fresh cod's livers.				
Alterative and tonic.				
Given three times a day	gtt. 10–15	gtt. 15–20	gtt. 20–30	ʒ½–1
Corrosive Sublimate. See *Corrosive Chlorid of Mercury.*				
Cream of Tartar. See under *Acid, Tartaric.*				
Creosote. (Beechwood Creosote.)				
Tonic, alterative, and antitubercular.				
Best given in an emulsion with Cinnamon-water, three times a day after meals	gt. ½	gtt. 2	gtt. 2–3	gtt. 3–5

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Creosote (*Continued*).				
Creosotal. (Carbonate of Creosote—92% Creosote.)				
Is preferable to Creosote because it has little odor, a more agreeable taste, and is better borne by the stomach	gt. ½	gtt. 2	gtt. 2–3	gtt. 3–5
Dermatol. (Bismuth Subgallate.) See under *Bismuth.*				
Digitalis. (From the leaves of Digitalis Purpurea.)				
Heart stimulant and tonic; also diuretic.				
Best given by mouth in the form of the Tincture and hypodermically either as the Tincture or as Digitalin.				
Tincture of Digitalis (10% leaves)	gt. ½	gt. 1	gtt. 1–2	gtt. 2–3
Infusion of Digitalis (66 gm. = 1 gm. leaves)	..	..	ʒ ½–1	ʒ 1–3
Digitalin (ten times strength of leaves).	gr. $\frac{1}{200}$	gr. $\frac{1}{200}$	gr. $\frac{1}{150}$	gr. $\frac{1}{100}$
Diphtheria Antitoxin. See *Serum, Anti-diphtheritic.*				
Dover's Powder. See under *Opium.*				
Epsom Salt. See under *Magnesium.*				
Ergot. (From the sclerotium of the Claviceps Purpurea of Rye.)				
Hemostatic, heart and circulatory stimulant.				
Fluidextract of Ergot (1 c.c.=1 gm. Ergot)	gtt. 2–3	gtt. 5	gtt. 5–8	gtt. 10–15
Eriodyctyon. See *Yerba Santa.*				
Ether.				
Used internally as:				
Compound Spirits of Ether. (Hoffmann's Anodyne, 32.5% Ether.)				
Anodyne, carminative, antispasmodic, and stimulant.				
Best given well diluted with water	gtt. 2	gtt. 3–5	gtt. 5	gtt. 5–10
Spirits of Nitrous Ether. (Sweet Spirit of Niter, 4% Ethyl Nitrite.)				
Used as a diaphoretic, diuretic and carminative.				
It is volatile and explosive and incompatible with many drugs. Best given alone or in a simple elixir	gtt. 2–3	gtt. 3–5	gtt. 5	gtt. 5–10
Fel Bovis. See *Ox-gall.*				
Ferrum. See *Iron.*				
Fowler's Solution. See *Arsenic.*				
Gallic Acid. See *Acid, Gallic.*				
Gentian.				
Extract of Gentian.				
Stomachic and bitter tonic.				
Given three times a day	..	..	gr. ¼–½	gr. ½–1
Glauber's Salt. (Sodium Sulphate.) See under *Sodium.*				

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Glonoin. See *Nitroglycerin.*				
Glycerin.				
Used chiefly as a demulcent base and a vehicle for other drugs.				
Glycyrrhiza. See *Liquorice.*				
Hexamethylenamin. Official name for the proprietary Urotropin, *q. v.*				
Hoffmann's Anodyne. See under *Ether.*				
Hydrargyrum. See *Mercury.*				
Hyoscyamus.				
Tincture of Hyoscyamus.				
Sedative and antispasmodic.				
Iron. Given every two hours.....	gt. ½–1	gtt. 1–2	gtt. 3	gtt. 3–5
Liquor Ferri et Ammonii Acetatis. (Basham's Mixture—Solution of Iron and Ammonium Acetate—10% metallic Iron).....	..	..	℥½	℥1
Ovoferrin. (Proprietary Organic Iron.)	gtt. 5	gtt. 10	gtt. 15–20	gtt. 20–30
Pyrophosphate of Iron (10% of metallic Iron).....	..	..	gr. 1–2	gr. 2–3
Syrup of the Iodid of Iron (5% Ferrous Iodid).....	gtt. 3	gtt. 6	gtt. 10	gtt. 20–30
Tincture of the Chlorid of Iron. (35% of Ferric Chlorid and must be at least one year old.).....	gt. 1	gtt. 3	gtt. 5	gtt. 10–15
Jalap.				
Powdered Jalap. (Contains 8% Resin.) Hydragog cathartic and diuretic.....	..	..	gr. 2	gr. 3
Lactic Acid. See *Acid, Lactic.*				
Liquorice.				
Compound Liquorice Mixture. (Brown Mixture—12% Paregoric.) Sedative expectorant mixture. Given at two-hour intervals.....	gtt. 15	gtt. 20	gtt. 30–40	gtt. 40–℥1
Compound Liquorice Powder. Laxative.....	gr. 10	gr. 10–20	gr. 30	gr. 40–℥1
Magnesium.				
Magnesium Carbonate. Antacid and laxative.....	gr. 5–10	gr. 20	gr. 30–40	gr. 40–℥1
Magnesium Citrate, Solution of. (Liquor Magnesii Citratis.) Laxative. For one dose.....	..	..	℥2	℥2–4
Magnesium Oxid. (Calcined Magnesia.) Antacid and laxative.....	gr. 5–10	gr. 10–20	gr. 20–30	gr. 30–40
Magnesium Sulphate. (Epsom Salt.) Laxative. To be given every two hours and discontinued when the desired effect has been produced.....	gr. 10–15	gr. 20	gr. 20–30	℥½–1

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Male-fern. See *Aspidium.*				
Mentha Piperita. See *Peppermint.*				
Mentha Viridis. See *Spearmint.*				
Mercury.				
Mass of Mercury. (Blue Mass—35% Mercury.)				
Cathartic and antisyphilitic.				
Used once a day	..	..	gr. 1	gr. 1–2
Corrosive Chlorid of Mercury. (Bichlorid of Mercury or Corrosive Sublimate.)				
Antisyphilitic.				
Given three times a day	gr. $\frac{1}{200}$	gr. $\frac{1}{100}$	gr. $\frac{1}{100}$	gr. $\frac{1}{75}$
Mild Chlorid of Mercury. (Calomel.)				
Cathartic, cholagog, antisyphilitic.				
At 30-minute intervals	gr. $\frac{1}{10}$	gr. $\frac{1}{6}$	..	..
At one-hour intervals	..	..	gr. $\frac{1}{4}$	gr. $\frac{1}{4}$
Rarely necessary to give more than one grain for laxative effect.				
Red Iodid of Mercury. (Biniodid.)				
Antisyphilitic.				
Given three times a day	gr. $\frac{1}{150}$	gr. $\frac{1}{100}$	gr. $\frac{1}{50}$	gr. $\frac{1}{25}$–$\frac{1}{10}$
Mercury with Chalk. (Gray Powder.) (38% Mercury.)				
Intestinal antiseptic, cholagog, and antisyphilitic.				
At one-hour intervals—total gr. 1	gr. $\frac{1}{4}$	gr $\frac{1}{4}$	..	..
At one-hour intervals—total gr. 2	..	..	gr. $\frac{1}{2}$	gr. $\frac{1}{2}$
Methyl Salicylate. See under *Acid, Salicylic.*				
Mindererus, Spirits of. See under *Ammonium.*				
Morphin. See under *Opium.*				
Myrrh.				
Tincture of Myrrh (20%).				
Used as a mouth-wash diluted with water.				
Niter. See under *Ether, Sweet Spirits of Niter.*				
Nitroglycerin. (Glonoin, Glyceryl Trinitrate.)				
Vaso-dilator	gr. $\frac{1}{400}$	gr. $\frac{1}{300}$	gr. $\frac{1}{200}$	gr. $\frac{1}{100}$
Spirits of Glyceryl Trinitrate, or Spirits of Glonoin, old U. S. P. (1% alcoholic solution.)	gt. $\frac{1}{4}$	gt. $\frac{1}{3}$	gt. $\frac{1}{2}$	gt. 1
Nux Vomica. (From Strychnos Nux Vomica.)				
Tincture of Nux Vomica (1% Strychnin).				
Stomachic and stimulant	gt. $\frac{1}{2}$	gt. 1	gtt. 1–2	gtt. 2–4
Strychnin. (Alkaloid of Nux Vomica.)				
General stimulant, well borne by children.				
Every two or three hours	gr. $\frac{1}{400}$–$\frac{1}{200}$	gr. $\frac{1}{150}$	gr. $\frac{1}{100}$	gr. $\frac{1}{100}$

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Oleum Gaultherium. (Oil of Winter-green.) See under *Acid, Salicylic.*				
Oleum Morrhuæ. See *Cod-liver Oil.*				
Oleum Olivæ. See *Olive Oil.*				
Oleum Ricini. See *Castor Oil.*				
Olive Oil.				
Laxative and nutrient	gtt. 15	gtt. 15–30	gtt. 30–℥1	℥1
Used at night by rectum for the cure of constipation	℥1	℥1½	℥2	℥3
Opium.				
Sedative, anodyne, hypnotic.				
Tincture of Deodorized Opium (10%).				
Used in 3- to 10-drop doses in enemata as a sedative for children under five years of age.				
Camphorated Tincture of Opium. (Paregoric—0.4% Opium.)				
Sedative and analgesic	gtt. 3–5	gtt. 10	gtt. 15–20	gtt. 20–30
Powder of Ipecac and Opium. (Dover's Powder—10% each of Ipecac and Opium.)				
Sedative	gr. ⅛–¼	gr. ½–¾	gr. 1–1½	gr. 2–3
Morphin. (Alkaloid of Opium.)				
Not well borne by children and best given hypodermatically	gr. 1/100	gr. 1/100	gr. 1/50	gr. 1/20
Codein. (Methylmorphin.)				
As sulphate or phosphate	..	gr. 1/20	gr. 1/10	gr. ⅛
Heroin. (Diacetylmorphin.)				
As hydrochlorid.				
Bronchial sedative	..	gr. 1/100	gr. 1/50	gr. 1/30
Orange-juice. (Citrus Aurantium.)				
Antiscorbutic	℥½	..	..	℥1
Ox-gall. (Fel Bovis—Fresh Ox-bile.)				
Used as a laxative in enemata—℥½–℥1 to a pint of water.				
Paregoric. *Camphorated Tincture of Opium.* See under *Opium.*				
Pepo. See *Pumpkin Seed.*				
Peppermint.				
Aqua Mentha Piperitæ—Peppermint Water. (0.2% Oil of Peppermint.)				
Carminative, sedative, corrective and vehicle	℥1	℥1–2	℥3	℥4
Pepsin.				
Powdered Pepsin	gr. 1	gr. 1–2	gr. 2–3	gr. 3
Essence of Pepsin	gtt. 20	gtt. 30–40	gtt. 40–℥1	℥1
Phenacetin. (Acetphenetidin.)				
Antipyretic and analgesic	gr. ½	gr. 1	gr. 1½	gr. 2
Phosphoric Acid. See *Acid, Phosphoric.*				

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
PHOSPHORUS.				
Oleum Phosphoratum (1% in Almond Oil). Alterative	gt. ½	gt. 1	gtt. 1½	gtt. 2–4
Syrup of Hypophosphites. (Calcium 4.5%, Sodium and Potassium each 1.5%.)	ʒ½	ʒ¾	ʒ1	ʒ1–2
PILOCARPIN. Not advised in the treatment of children.				
POTASSIUM.				
Potassium Acetate. Diuretic, refrigerant, and alterative	gr. 1–2	gr. 2–3	gr. 3	gr. 5
Potassium Bicarbonate. Should not be given to children on account of its disagreeable taste.				
Potassium Bitartrate. (Cream of Tartar.) See under *Acid, Tartaric.*				
Potassium Bromid. See under Bromin.				
Potassium Citrate. Diaphoretic and diuretic. Used in acute bronchitis	gr. ½–1	gr. 1–2	gr. 3	gr. 4
Potassium Chlorate. Astringent and antisialogog. Used in stomatitis of every type, in tonsillitis and angina	gr. ½	gr. 1	gr. 2–3	gr. 3
Potassium Iodid. Antispasmodic and antisyphilitic	gr. 1	gr. 1–2	gr. 2–3	gr. 3
Potassium and Sodium Tartrate. (Rochelle Salt.) See under *Acid, Tartaric.*				
PRUNUS VIRGINIANA. See *Wild Cherry.*				
PUMPKIN SEED. Pepo. Teniafuge. Best given in an emulsion; average dose ʒ1.				
QUASSIA.				
Infusion of Quassia. Vermifuge. An extemporaneous infusion is made by adding 1 or 2 oz. of Quassia chips to a pint of water. This is injected high up into the bowel. Used particularly to destroy the Oxyuris vermicularis.				
QUININ. (Alkaloid of Cinchona.)				
Bisulphate of Quinin	gr. 1	gr. 1–2	gr. 2–3	gr. 3–4
Sulphate of Quinin	gr. 1	gr. 1–2	gr. 2–3	gr. 3–4
Tincture of Cinchona	..	gtt. 5–10	gtt. 15	gtt. 20–30
All these are bitter tonics and antiperiodics.				
RHAMNUS PURSHIANA. See *Cascara Sagrada.*				
RHUBARB.				
Powdered Rhubarb. Laxative	gr. 1–2	gr. 2–3	gr. 3–4	gr. 5

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Rhubarb (*Continued*).				
Aromatic Syrup of Rhubarb.				
Laxative and flavoring medium.....	ʒ1	ʒ2	ʒ3	ʒ4
Mixture of Rhubarb and Soda.				
Corrective and laxative.				
℞. Pulveris rhei				
Sodii bicarbonatis.....āā gr. 48				
Syrupi rhei aromatici..... ℥1				
Aquæ.....q. s. ad ℥2				
M.				
Sig.—One to three doses daily.....	ʒ½	ʒ2	ʒ3	ʒ4
Rochelle Salt. See under *Acid, Tartaric.*				
Saccharin. (Benzosulphinidum.)				
Substitute for sugar, but 200 times sweeter.				
For 8 oz. of food; ½–1 grain is sufficient.				
Saccharose. See *Sugar.*				
Salicylic Acid. See *Acid, Salicylic.*				
Salol. See under *Acid, Salicylic.*				
Santonin. (Anhydrid of Santoninic Acid.)				
Vermifuge, for round-worms particularly.....	gr. ½	gr. 1	gr. 1–2	gr. 2
Senna.				
Cathartic. Best given as Compound Liquorice Powder, of which it is an ingredient, *q. v.*				
Serum Antidiphtheriticum. (Diphtheria Antitoxin.)				
For immunization:				
1000 to 2000 units.				
In faucial diphtheria:				
3000 to 5000 units and repeat in 8 hours if required.				
In laryngeal diphtheria:				
5000 units and repeat in 8 hours if required.				
The repetition of the doses of Antitoxin is discontinued only when the case ceases to require the serum.				
The dosage is independent of the age of the patient.				
Sodium.				
Sodium Benzoate.				
Antiseptic, antipyretic, and antirheumatic.				
Used in cystitis with alkaline fermentation to acidify the urine, which it does by the liberation of hippuric acid.....	gr. 1	gr. 1–2	gr. 2	gr. 3
Sodium Bicarbonate.				
Antacid, antirheumatic.....	gr. 1–2	gr. 2	gr. 3	gr. 5

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Sodium (*Continued*).				
Sodium Borate. (Borax.) Antiseptic and astringent. Used as a gargle and mouth-wash in angina and stomatitis—℥1 to ℥8 of water.				
Sodium Bromid. See under *Bromin.*				
Sodium Iodid. Uses and doses the same as Potassium Iodid, *q.v.*				
Sodium Phosphate. Laxative and cholagog	gr. 5–10	gr. 10–15	gr. 15–20	gr. 20–30
Sodium Sulphate. (Glauber's Salt.) Cathartic. Used in intestinal infection of inactive type	gr. 15–30	gr. 30–45	gr. 40–℥1	℥1
Sodium Salicylate. See under *Acid, Salicylic.*				
Spearmint. (Mentha Viridis.)				
Water of Spearmint. (Aqua Menthæ Viridis—0.2% Oil of Spearmint.) Carminative, sedative, corrective, and vehicle	℥1	℥2	℥3	℥4
Strontium.				
Strontium Bromid. See under *Bromin.*				
Strophanthus.				
Tincture of Strophanthus (11% in New Pharmacopeia, or twice former strength). Cardiac tonic and diuretic. Preferred to Digitalis in the treatment of children because better borne	gt. 1	gtt. 1–2	gtt. 2	gtt. 2–3
Strychnin. See under *Nux Vomica.*				
Sugar. (Cane-sugar or Saccharose.) Sweetening agent. May be substituted for Lactose in the adaptation of cow's milk for infant-feeding. 1 level tablespoonful equals ½ oz.				
Sugar of Milk. (Lactose.) Used as an excipient and in the adaptation of cow's milk for infant-feeding. 1 level tablespoonful equals ⅓ oz.				
Sulphonal. Not advised in the treatment of children.				
Sulphur.				
Precipitated Sulphur, or Milk of Sulphur. Laxative and alterative. Given usually in syrups or other heavy vehicles	gr. 5	gr. 5–10	gr. 15–30	℥1
Used also as a reducing agent in Bismuth mixtures when the stools do not become dark colored (see p. 213)	gr. 1	gr. 1	gr. 1	gr. 1

DRUGS AND DRUG DOSAGE—FOR INTERNAL USE—(*Continued*)

Drug.	Dose.			
	6 Months.	18 Months.	3 Years.	5 Years.
Tannalbin. See under *Acid, Tannic.*				
Tannigen. See under *Acid, Tannic.*				
Tartar Emetic. See under *Acid, Tartaric.*				
Tartaric Acid. See *Acid, Tartaric.*				
Terebene.				
Stimulating expectorant and antiseptic	..	gt. 1	gtt. 1–2	gtt. 2
Terpin Hydrate.				
Expectorant and antiseptic.				
Used in subacute and chronic bronchitis	..	..	gr. $\frac{1}{4}$	gr. $\frac{1}{2}$
Trional.				
Not advised in the treatment of children.				
Urotropin. (Trade name for Hexamethylenamine.)				
Urinary antiseptic and sedative	gr. $\frac{1}{2}$	gr. 1	gr. 1–2	gr. 2–5
Whisky. See under *Alcohol.*				
Wild Cherry.				
Syrup of Wild Cherry. (Syrupus Pruni Virginiani.)				
Bronchial sedative and vehicle.				
Contains Hydrocyanic Acid	..	..	ʒ$\frac{1}{2}$	ʒ1

DRUGS FOR EXTERNAL USE

Acid, Boric.

Antiseptic of mild grade. 4% is a saturated solution.

Used both in solution and in ointments.

In the form of scales it is most soluble and most convenient.

Acid, Carbolic. See *Phenol.*

Acid, Chromic. (Chromic Trioxid.)

A very strong caustic and astringent, used as a substitute for Nitrate of Silver.

Acid, Nitric (68% pure acid).

Used as a caustic.

Acid, Salicylic.

Used in lotions or in ointments, 1% to 3%, for skin affections.

Acid, Tannic.

Astringent.

Used in 1% solution in dysentery; as an ingredient of suppositories for hemorrhoids. See also *Glycerite of Tannin* under *Glycerin.*

Adrenalin. (Trade name for the active principle of the Adrenal Gland.)

Used in a solution in the strength of 1 part to 1000 of normal saline solution or sterilized oil.

Local hemostatic and astringent. It will render bloodless the field of operation of the eye, nose, and throat, but its use is often followed by hemorrhage.

Aluminium Acetate, Solution of.

Antiseptic dressing for cellulitis, abscesses, etc.

1. ℞. Aluminii sulphatis ..... ʒ3$\frac{1}{2}$
   Acidi acetici ..... ʒ4$\frac{1}{2}$
   Aquæ ʒ10
2. ℞. Calcii carbonatis ..... ʒ1$\frac{1}{2}$
   Aquæ ..... ʒ2$\frac{1}{2}$

Add 1 to 2, stirring.

AMYLUM. See *Starch.*

ARGENTUM. See *Silver.*

ARGYROL. See *Silver.*

ARISTOL. (Thymol Di-iodid.)

Mild antiseptic, used as a dusting-powder or in ointments.

BALSAM OF PERU.

A stimulating dressing for wounds and ulcers.

In Castor Oil, one part of the Balsam to six of the oil, it makes a useful application for burns and wounds.

BENZOIN.

Compound Tincture of Benzoin.

Used as a bronchial sedative in steam inhalations, one-half ounce to two pints of water.

BICHLORID OF MERCURY. See under *Mercury.*

BISMUTH SUBGALLATE. (Dermatol.)

Used externally as a drying antiseptic powder, either pure or in combination. Also as an ingredient of ointments of 10% to 20% strength.

BORACIC ACID. See *Acid, Boric.*

CACAO-BUTTER. (Oleum Theobromatis.)

A fixed oil expressed from the seeds of the *Theobroma Cacao.* Melts at 30°–35° C. (86°–95° F.).

Used as an emollient and as a base for suppositories. It may be used for nutrient inunctions, but it is less effective than Goose Oil.

CALAMINE. (Zinc Carbonate.)

Used as an ingredient of soothing lotions in itching affections of the skin—eczema, urticaria, dermatitis venenata, etc.

CALOMEL. See under *Mercury.*

CANTHARIDES.

Vesicant. Used best in the form of Collodion of Cantharides, *q. v.*

CARRON OIL. (Limentum Calcis.)

Consists of equal parts of Lime-water and Linseed Oil.

Used as a soothing application for burns and scalds.

CHLOROFORM.

Locally a rubefacient and, when confined, a vesicant as well. A useful ingredient of liniments.

By inhalation, a general anesthetic.

CHRYSAROBIN.

Used in 5% ointment for psoriasis and tinea tonsurans.

COCAIN.

Alkaloid obtained from several varieties of *Coca.*

A local anesthetic when applied to wounds or mucous surfaces or when injected hypodermically.

For local application, 3% to 10% solutions.

For hypodermic use, 0.2% to 4% solutions.

COD-LIVER OIL.

May be used locally as a nutrient inunction, but its odor is objectionable.

COLLODION.

Solution of Pyroxylin in Alcohol and Ether.

Collodion of Cantharides (60% Cantharides). An excellent blistering agent.

Collodion of Ichthyol (10%–20%). Used to cover the wound after aspirations or lumbar punctures, and in checking the spread of erysipelas.

Collodion of Iodoform (5%). Used in erysipelas.

Collodion of Oil of Cade (1%–5%). Used in eczema.

Collodion of Salicylic Acid (10%). Used in removing corns and callouses.

CREOSOTE.

Used in inhalations as a pulmonary antiseptic.

DERMATOL. See *Bismuth Subgallate.*

EUCAIN.

Beta-eucain. Local anesthetic with similar action and uses to Cocain, but without its toxicity. Its solutions can be sterilized without injury by boiling.

FORMALDEHYD.

Antiseptic and deodorant.

Used in solutions of from 0.5% to 2% strength, as an antiseptic.

Used in the form of the gas for disinfecting, the gas being generated by heat, from solutions, or from the solid, Paraform.

GLYCERIN.

Used chiefly as a solvent or excipient. Very hygroscopic. It is the base of the Glycerites.

Glycerite of Carbolic Acid—20% Phenol in Glycerin. An external antiseptic and antipruritic.

Glycerite of Starch—10%. A vehicle for skin preparations and for pills.

GOOSE OIL.

The oil tried from the goose. An excellent oil for nutrient inunctions. It is better than Olive Oil or Cacao-butter, for being an animal oil it is more readily absorbed by the skin. It is semifluid, has a low melting-point, and does not become hard after having been rubbed in.

GRINDELIA ROBUSTA.

The fluidextract, in the strength of one dram to a pint of water, is used as a wet dressing in dermatitis venenata.

GUAIACOL.

Combined with equal parts of Glycerin, it is used in acute joint affections, for its analgesic effect.

HAMAMELIS. See *Witch-hazel.*

HYDRARGYRUM. See *Mercury.*

HYDROGEN PEROXID.

Antiseptic and deodorizer. Used in 10-volume, 3% solution to clean wounds, and to dissolve and destroy pus.

ICHTHYOL.

Used in 1% solution in intertrigo.

Used in 5% to 50% solutions in skin diseases or in erysipelas.

Used in 5% to 50% ointments in skin diseases or in erysipelas.

Used suspended in oil in strength of 5% to 25% as a nasal spray.

IODIN.

Tincture of Iodin (7%).

Antiseptic and counter-irritant.

Used particularly in tinea tonsurans and tinea circinata.

IODOFORM. Formyl Tri-iodid.

Antiseptic and alterative.

Used in the form of a powder, an ointment, or on gauze in the strength of 5% to 10%.

KAOLIN.

Cataplasma Kaolini.

A smooth homogeneous mass consisting of Kaolin, Boric Acid, Thymol, Methyl Salicylate, Oil of Peppermint, and Glycerin.

LANOLIN.

Used as an ointment base.

LEAD AND OPIUM WASH.

Anodyne lotion.

℞. Liquoris plumbi subacetatis..... ℥iv
Tincturæ opii..... ℥j
Aquæ..... ℥xvj

Fiat mistura.

Sig.—Use externally.

MENTHOL. (Peppermint Camphor.)

Sedative, analgesic, refrigerant, and antipruritic.

Used in ointments, 1% to 5%.

Used in oily solutions, 1% to 5%.

Used triturated with equal parts of Camphor as an anodyne.

MERCURY.

Bichlorid of Mercury.

Antiseptic. Used in 1:1000 to 1:20,000 solutions.

Calomel.

A milder antiseptic than the foregoing. Used as a dusting-powder in eye affections and in the lesions of secondary syphilis.

Mercury and Ammonium Chlorid. (White Precipitate.)
Used in ointments of 1% to 10% strength as an antiparasitic and antisyphilitic. Of particular value in impetigo contagiosa, ringworm, etc.
Yellow Oxid of Mercury.
Antiseptic. Used in ointments of 0.5% to 10% strength in ophthalmia. Of value also in ringworm and syphilitic eruptions.

MUSTARD.
Counter-irritant.
In the form of papers (*chartæ*) for local pain or vomiting.
In the form of powder:
In pastes of a strength of 1 part of mustard to from 2 to 6 parts of flour.
In baths—1 tablespoonful to 6 gallons of water.
In packs, in the same proportion.

OIL OF CADE. (Oil of Juniper Tar.)
Used as an antiparasitic in skin diseases.
In powders, 1% to 5% in a base of Stearate of Zinc.
In ointments, 1% to 5%.
In Collodion, 1% to 5%.

OIL OF TURPENTINE. (Spirits of Turpentine.)
Rubefacient and counter-irritant.
Used as an ingredient of liniments.
Used in the form of turpentine stupes for the relief of abdominal distention. Flannel cloths are wrung out in hot water to each pint of which gtt. 10–20 of Oil of Turpentine have been added, and are then applied to the abdomen.

OLIVE OIL.
Used externally as a nutrient inunction.

PETROLATUM (Petroleum Jelly or "Vaselin").
Used as a base for ointments.

PHENOL. (Pharmacopeial name of Carbolic Acid.)
Local anesthetic and antiseptic.
Used as an antiseptic in solutions of the strength of 5% or less.
Used as a caustic and local anesthetic in strength of 95%.
Children are very susceptible to Phenol poisoning.

PIX LIQUIDA. See *Tar.*

POTASSIUM PERMANGANATE.
Antiseptic and disinfectant.
Used in solutions in the strength of 1:4000 to 1:2000 on mucous surfaces, and in the strength of 1:1000 on ulcers and superficial wounds.

RESORCIN.
Antiseptic in skin diseases, particularly in seborrheic eczema.
Lotions, 1% to 5%.
Ointments, 1% to 5%.

SILVER.
Silver Nitrate. Antiseptic and astringent. Used in solutions of 1% to 50% strength. As a caustic, it is used in the solid form.
Argyrol. (Silver Vitellin—Proprietary.)
A mild antiseptic, not approaching the Nitrate in efficacy. Used in solutions of 5% to 50% strength or in ointments of 5% to 50% strength.

SODIUM BICARBONATE.
Used in saturated solution as an antipruritic and as an analgesic in skin diseases and burns.

STARCH.
Used as the base of drying-powders.

SULPHUR.
In 5% to 55% ointments as a parasiticide, particularly in scabies.

TAR. (Pix Liquida.)
Antiseptic. Used in skin diseases as the officinal ointment (50%) or in ointments with other ingredients.

ZINC OXID.
Used as a 20% ointment in Benzoinated Lard, in skin diseases, such as eczema, needing a mild astringent.
Used in dusting-powders in the strength of 5% to 10%.
Official Zinc Ointment makes a good base for stronger antiseptics, such as Tar and Oil of Cade.

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